Vol. XXXVI
April, 1942
Number 4

ENGINEERS EXCAVATING

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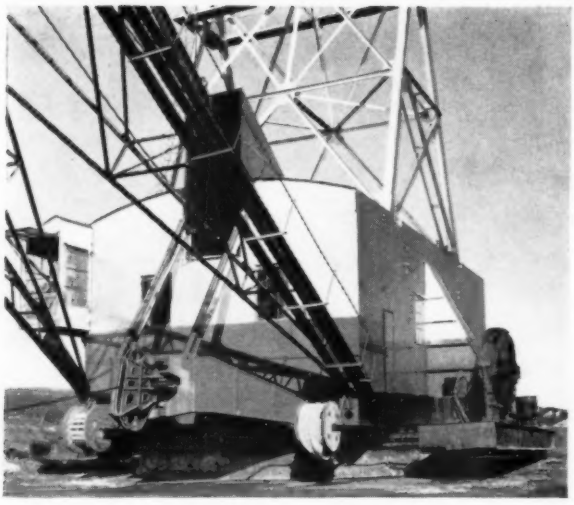

The 9-W carries 7 to 10-yard buckets on 160' to 200' booms.
Other models use 3 to 20-yard buckets on 80' to 250' booms.

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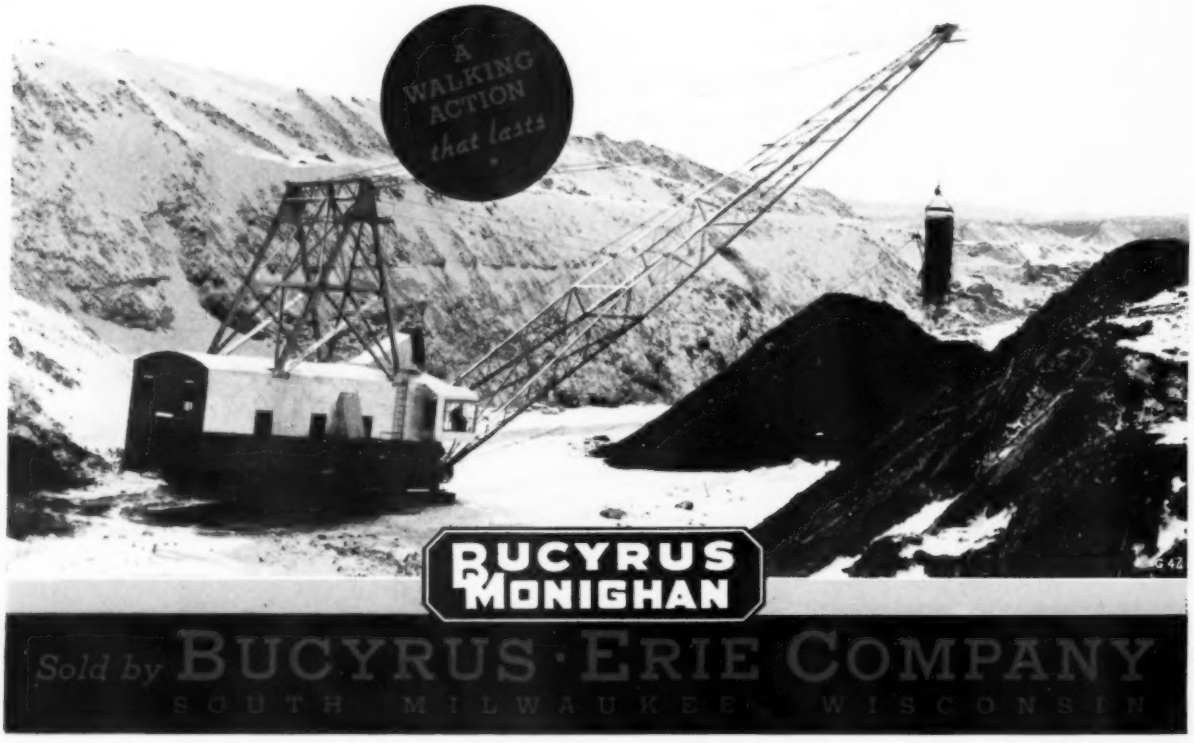

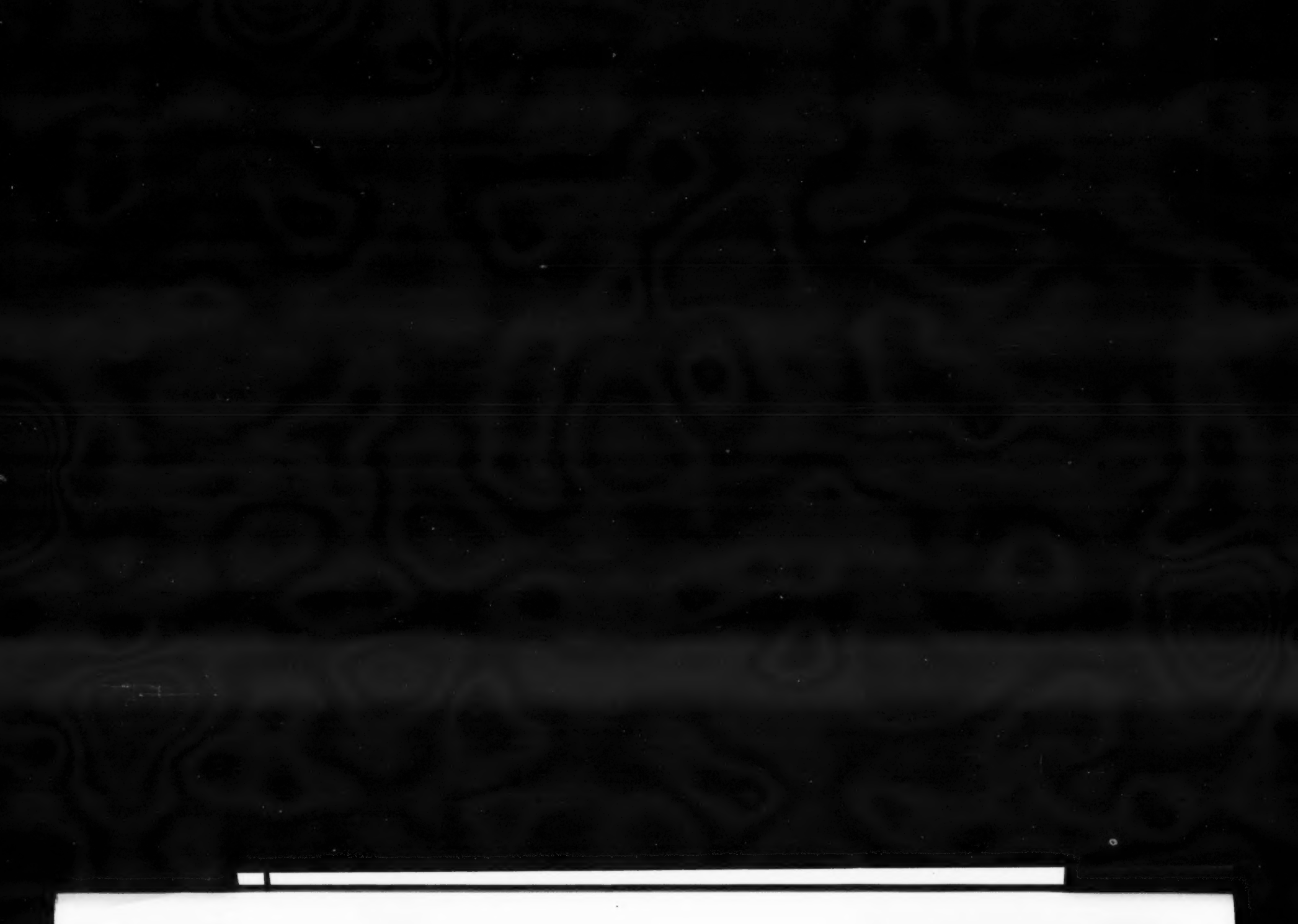

EXCAVATING ENGINEER

FOUNDED 1905

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Published Monthly by THE EXCAVATING ENGINEER PUBLISHING COMPANY, South Milwaukee, Wisconsin, U.S.A.

F. O. WYSE, *Manager* — ARNOLD ANDREWS, *Assistant Manager*
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CCA Member Controlled Circulation Audit

Regular subscription: 25 cents per copy, $2.50 a year; Canada, subject to publication policy, $3.50 per year. Special subscription: Upon application on card inserted in this number this publication will be sent frequently (not regularly) free of charge, to companies, executives and supervisors engaged actively in the industry of excavation.

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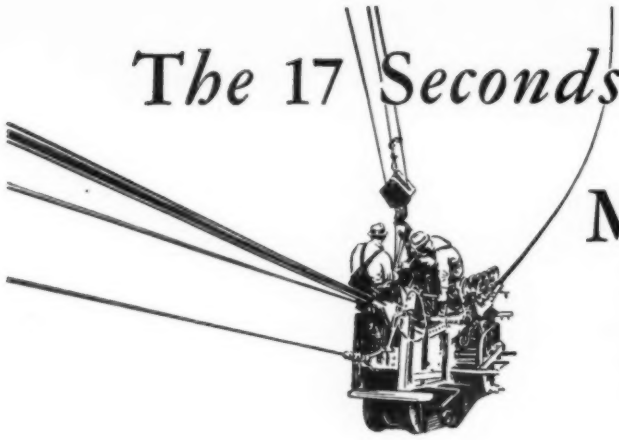
The 17 Seconds that Make a Fortune



How the Operating Time of Cableways Can Be Reduced

by R. F. EMERSON, *Industrial Dept., General Electric Company*

HUGE savings in the cost of constructing big dams can now be effected because General Electric engineers have, for the first time, applied variable-voltage control to cableways for handling concrete and have materially reduced their operating time. By this method an average of 17 seconds is shaved from the time of the return trip of the bucket on one big dam now under construction.

On this job, three Lidgerwood cableways are used to handle 3,000,000 yards of concrete in 8-yard buckets. And since the dam has a total length of 3500 feet and a maximum depth of 560 feet, more than 580 hours of working time will be saved in the operation of each cableway. Translated into wages, power savings, overhead, interest charges, and other advantages, the estimated saving to the contractor will be more than $150,000.

Most cableway hoists are operated by wound-rotor induction motors by which the operator lowers the bucket at high speed and saves time. He does this by running the motor above synchronism and operating it with resistance in the secondary. To stop the bucket, he plugs the motor by reversing the master switch.

However, when the empty bucket is returned for another load, the motor runs under a light motoring load and is worked considerably below its normal rating. And since it is inherently impossible to run an induction motor above synchronous speed when operating under a motoring load, there is no way to increase the speed of the empty bucket on the return trip.

How to Increase Return Speed

Variable-voltage control can now be used to retain this high speed when the bucket is lowered and to speed up the bucket when hoisted. In this system, a d-c generator, driven by an a-c motor, furnishes power to a d-c hoist motor that raises and lowers the bucket. By varying the generator voltage, the bucket can be accelerated or retarded smoothly, and higher speed of the empty bucket is attained, thus reducing the time of the return trip over that required with a-c drive.

There are other advantages of this system which result directly in dollar savings. It permits the operator to "spot" the bucket with greater ease, and all "jogging" operations are more easily and quickly handled.

Because it is perfectly feasible to use an over-excited synchronous motor for driving the d-c generator, it is possible to raise the power-factor, with a corresponding reduction in power charges. Also, the life of the haulage cable is increased because the variable-voltage equipment accelerates and retards smoothly—without jerking.

No Power Wasted

Another feature of the variable-voltage system is the elimination of power-wasting external resistances. During acceleration of the wound-rotor motor formerly used, full line voltage was applied to the motor terminals, and the external resistance absorbed approximately half of the acceleration power. This was dissipated in the form of heat. And when the descending bucket was plugged to rest, power was taken by the wound-rotor motor from the electric supply line.

With the new variable-voltage drive, during acceleration and retardation external resistance losses are negligible. Retardation of the descending bucket is obtained by regenerating power to be used by other motors on the job.

R. F. EMERSON

This first application of variable-voltage (Ward-Leonard) control in the operation of concrete-handling cableways is another contribution by General Electric engineers to electrical progress in the construction industry. Perhaps you, too, have a problem involving electrical knowledge and equipment. Get in touch with the nearest G-E Office. One of our engineers will be more than glad to help you. General Electric Company, Schenectady, N. Y.

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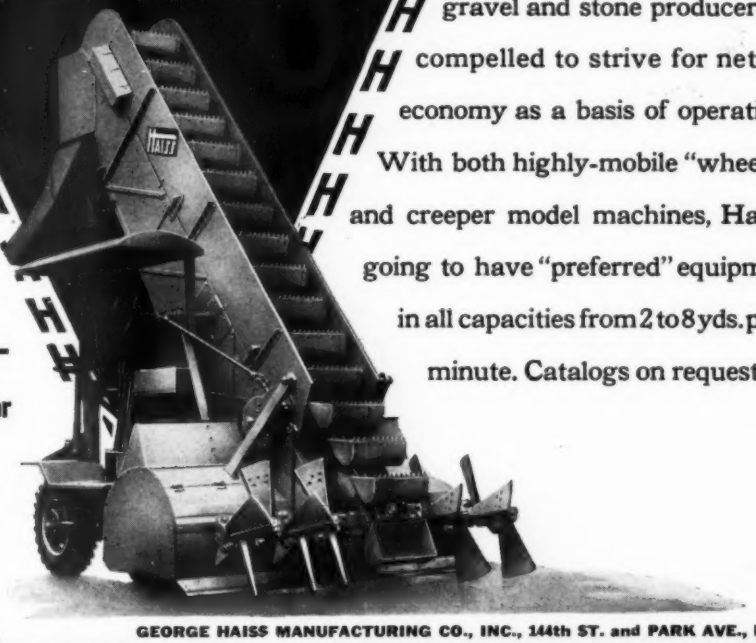

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Soil Stabilization Mel

The Matich Brothers and E. L. Yaeger of California team up to push an interesting soil-cement anchorage and a new runway out on schedule for U. S. Army war birds

MARCH FIELD, headquarters of many of the men, officers and ships of the U. S. Army's Fourth Air Force, is following a program of expansion similar to that of other air posts in various parts of the United States.

One of the most interesting construction features of the project was a new runway that has been laid diagonally down the field in the direction of the prevailing winds, with a 472,000 square yard soil cement anchorage placed alongside to accommodate an increasing number of planes. This anchorage embodies an unusually effective variation of soil stabilization methods which might well be successfully duplicated where soil conditions are equal.

The work was done under the design and supervision of the U. S. Engineer Department, who called for competitive bids in June, 1941. A $1,000,000 contract was let to Matich Brothers of Elsinore and E. L. Yaeger of Riverside, California, who were allotted 120 calendar days from the time official notice to proceed was given for the completion of the contract.

Included in the various parts of the work were some 200,000 cubic yards of rough grading and excavation of different types. The proposed runway and anchorage areas were covered with grass and light weeds. Before excavation and grading operations these areas were burned by a labor crew. At the far end of the runway it was necessary to remove an accumulation of trash and tin cans dumped in a waste pit during the years. Because this removal was urgent, a second pit was dug nearby, off the runway site, by four Caterpillar D8 tractors with 18 cubic yard LeTourneau scrapers. The excavated earth was dumped in a pile on one side of the waste dump containing the cans. Then the debris, loaded into a fleet of 5-yard GMC and International trucks by a Lorain Model 75 shovel, was hauled to the new pit. The dirt pile was picked up and placed by scrapers in 6-inch layers in the excavated dump, sprinkled with a water hose and rolled to a good density with a water-ballasted sheepsfoot roller.

• First step in the construction of soil-cement strips at March Field was the setting of 4"x6" header boards in shallow trenches along the course boundaries.

Grading the Runways

All of the runway and anchorage area required some kind of grading. Four more Caterpillar D8's with LeTourneau 20 yard scrapers were added to the four already at work, and the eight units began cutting the natural ground surface to runway grades. The survey crew was doubled so that enough grade stakes could be set to guide the tractor operators.

The area being graded was several hundred feet wide and several thousand feet long. Working with tractor drawn scrapers, it might have been easy to haul material much too far, thus decreasing the effectiveness of the self contained excavating units. The work therefore received the personal supervision of John Matich himself, one of the contracting partners. Mr. Matich soon had the job divided up into a number

of short hauls, where fill and excavation quantities balanced.

By keeping hauls down to an average distance of 800 feet Mr. Matich was able to account for an average output of 500 cubic yards per unit per 8-hour shift. One location, requiring a 2,000 foot haul, demonstrated excellently the important relationship between high output and short hauling distances on tractor-scraper work.

The soil was a hard, dry brownish material, carrying from 3 to 15% by volume of clay. All of the soil particles would pass a No. 4 screen, and perhaps 30% would pass a screen having 200 openings per inch. Translated into cat skinner language, this means that there was plenty of dust eating during the early stages of the job. Dirt was hard to load into a scraper and sometimes it was necessary to "gouge" the scraper bowl to pick up a full load. This practice was held to a minimum because of possible damage to equipment.

Dust conditions were frequently so bad that the machine operators wore respirators or wished they had them. The new runway ran parallel to one already existing. Slipstreams from propellers on departing planes aided the wind in kicking up clouds of dust. Water was dumped on the site in truckloads, but the thirsty ground absorbed it as fast as it was poured on. The water accomplished one necessary end. It kept the field open for flying at all times, and this turned out to be one of the contractor's main problems.

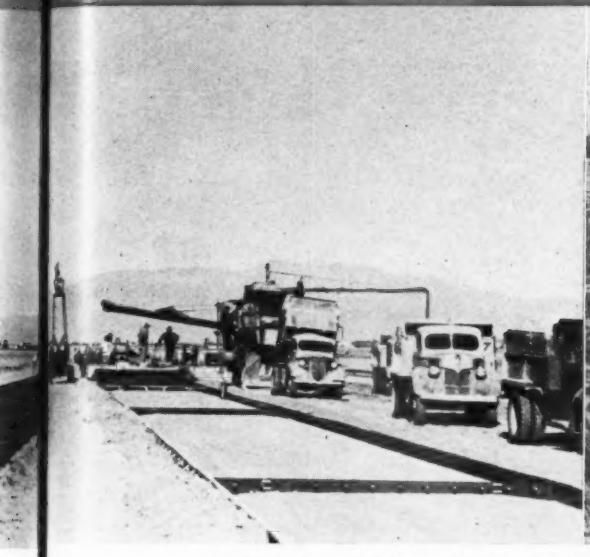
Before any concrete or soil cement could be laid, some 15,230 feet of concrete pipe drains ranging in diameter from nine to 36 inches had to be placed to take care of the subgrade during the rainy winter months. Nearly two miles of electrical duct banks for future airport lighting also were placed. All of this pipe had to be laid in ditches dug by trenching machines or draglines. The proper coordination of trench excavation work to permit planes to land and taxi in without interference required not only very careful planning on the part of the contractor but hearty, flexible cooperation as well from Resident Engineer George Davis and Colonel B. G. Weir, commanding officer of March field.

An Austin trenching machine excavated the trenches in which pipe up to 24 inches in diameter was placed. Larger sizes were laid in ditches excavated by a 2¼-yard Northwest dragline. Backfilling was very carefully and thoroughly done by compressed air tampers to make sure no settlement would occur under the concrete slab. As soon as this was finished, the surface was ready to receive the 9-6-9 inch concrete runway or the soil cement stabilization, as the case might be.

Soil-Cement Operations

By far the most interesting part of the job was the stabiliza-

ghods at March Field



• A U. S. Army bomber comes in on one of the old runways, while at the right, concrete laying equipment works on additional landing space.

• Both dry and wet soil-cement mixing operations are handled by this tractor-towed plow. Note leaning wheel which insures thorough processing at headers.

tion of nearly a half million square yards of soil by the addition of 12% of portland cement. The completed stabilized anchorage will be used for an auxiliary runway and for parking the landed planes.

Preliminary field studies by the U. S. Engineer Department laboratory showed variables in the soil not perceptible to the untrained eye. The clay content varied from 3 to 15%. In some locations more coarse soil particles were presented than in others.

• The four pictures on these pages illustrate the main steps in applying March Field's soil-cement topping coat. First, a "sweetening spread" of cement is applied by a Buckeye spreader box.

Model 511 diesel patrol. A LeTourneau ripper, pulled through the strip several times by a Caterpillar D7 tractor, loosened the full 6-inch depth before the pulverizing machines went to work. Before cement was added the soil had to be fully pulverized, with a

• Next, a Caterpillar tractor tows a Killefer disc over the surface, cutting tiny keyways into the solid strip for better binding qualities.

Since it was highly desirable from the standpoint of contractor economy to process a strip the full length of the anchorage, some universal system had to be worked out which would take in all of the inherent soil characteristics and at the same time give the most uniform resulting values possible.

When finished, the stabilized soil should have the characteristic of well-mixed concrete in that its particles should stick together with the cement paste. At the same time the greatest possible number of soil particles should be crowded into a given volume. This optimum density is important as there is a definite relationship between high soil densities and high compressive strength of the soil-cement.

Courses were laid out full length across the anchorage in such a way that as few soil variables as possible were taken in. Careful and rigid laboratory standards were set up, including triple sampling of each strip in each of three critical construction phases.

The courses were spotted by a survey party, who also set grade stakes along the line each 50 feet. A Caterpillar No. 12 patrol, with the blade tilted on a 45 degree angle, then dug a shallow trench on each side of the course. Timbers of 4"x6" dimensions were set to grade with the 4-inch dimension up, and staked down. The top edge was set flush with the proposed soil cement grade. No dowel bars or vertical construction joints were placed between courses; the header boards were simply removed and courses butted together.

The strip was then levelled of ruts and dust piles by an Adams

limited amount of water added. The laboratory had taken many soil samples, and had determined that the March Field soil could hold up to nine per cent of moisture without setting up hydration in the cement.

While the ground was rooted, a government laboratory man sampled the soil in that state to determine just how much moisture was already contained in the natural ground, if any. By deducting this from the 9% allowed, a guiding figure was arrived at for the addition. Water was added on the basis of .65 gallon per square yard per 1% moisture increase, tempered somewhat by the judgment

of the tank truck operator. Superintendent Harold H. Root, who was exclusively in charge of the soil cement, was anxious, of course, to get the strips worked up thoroughly with 7 or 8% of moisture to be on the safe side of the percentage. This pulverizing and watering was usually completed by dusk on the day preceding the final processing. About three hours were usually taken to complete this initial processing.

Laboratory men checked the soil at this stage to sample the fineness, and to prevent excessive application of water. The samples were baked out in pans to check the water content accurately.

About three hours before sunrise a labor crew spread the sacked cement over the course. While the strips averaged 25 feet in width, they did vary somewhat, so it was necessary to arrive at some guide for scattering the cement to the required 12% ratio. The laboratory boys entered the picture again, giving the number of sacks per station to the night foreman, who followed their suggestions accordingly. On a station of 100 feet on a 25-foot wide course, for instance, let us suppose that 150 sacks of cement were required. Each four feet would then require six sacks. The four foot divisions were taken off a 28-foot measuring stick and the sacks were evenly distributed across the course.

Spreading the Cement

Beginning at dawn, or as soon thereafter as possible, the cement was dumped and spread. From that time forward the job was supervised by two men: Superintendent Root and Resident Engineer Davis, each of whom took personal interest in pushing the operations within the allowable time cycle of six hours from the time water was added to the cement spread until the course was finally rolled and compacted.

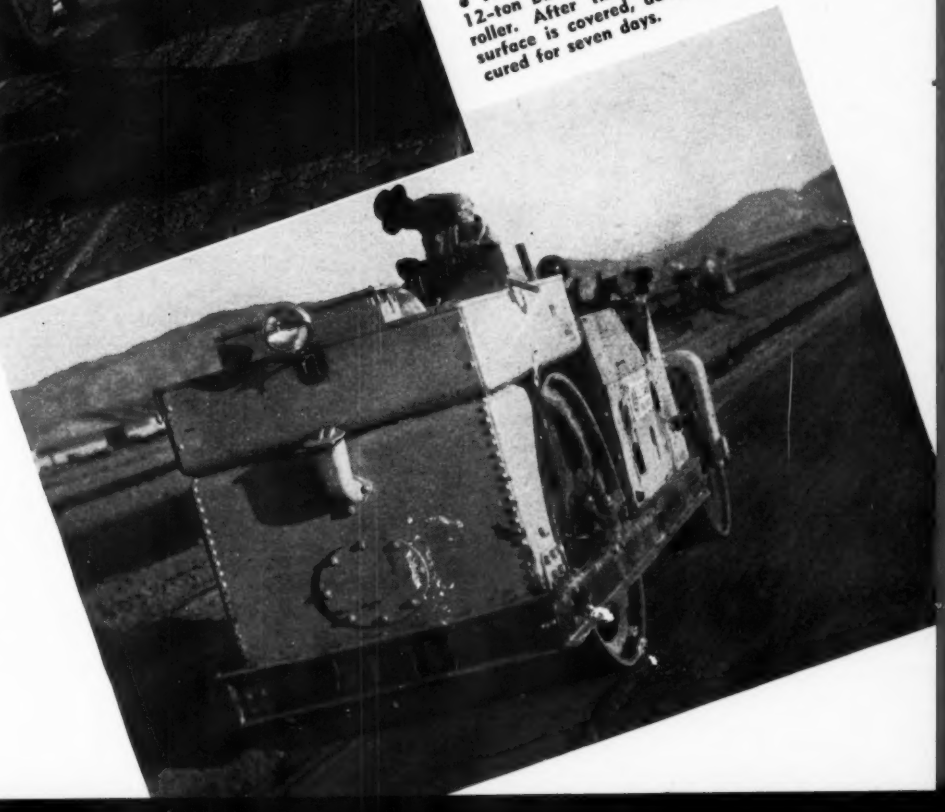
The cement was thoroughly mixed into the soil before final water was applied, however. The usual agricultural instruments; plow, cultivator and disc, were used. Not until the soil-cement was evenly mixed was water added to bring the course up to its compaction content of 14% or thereabouts.

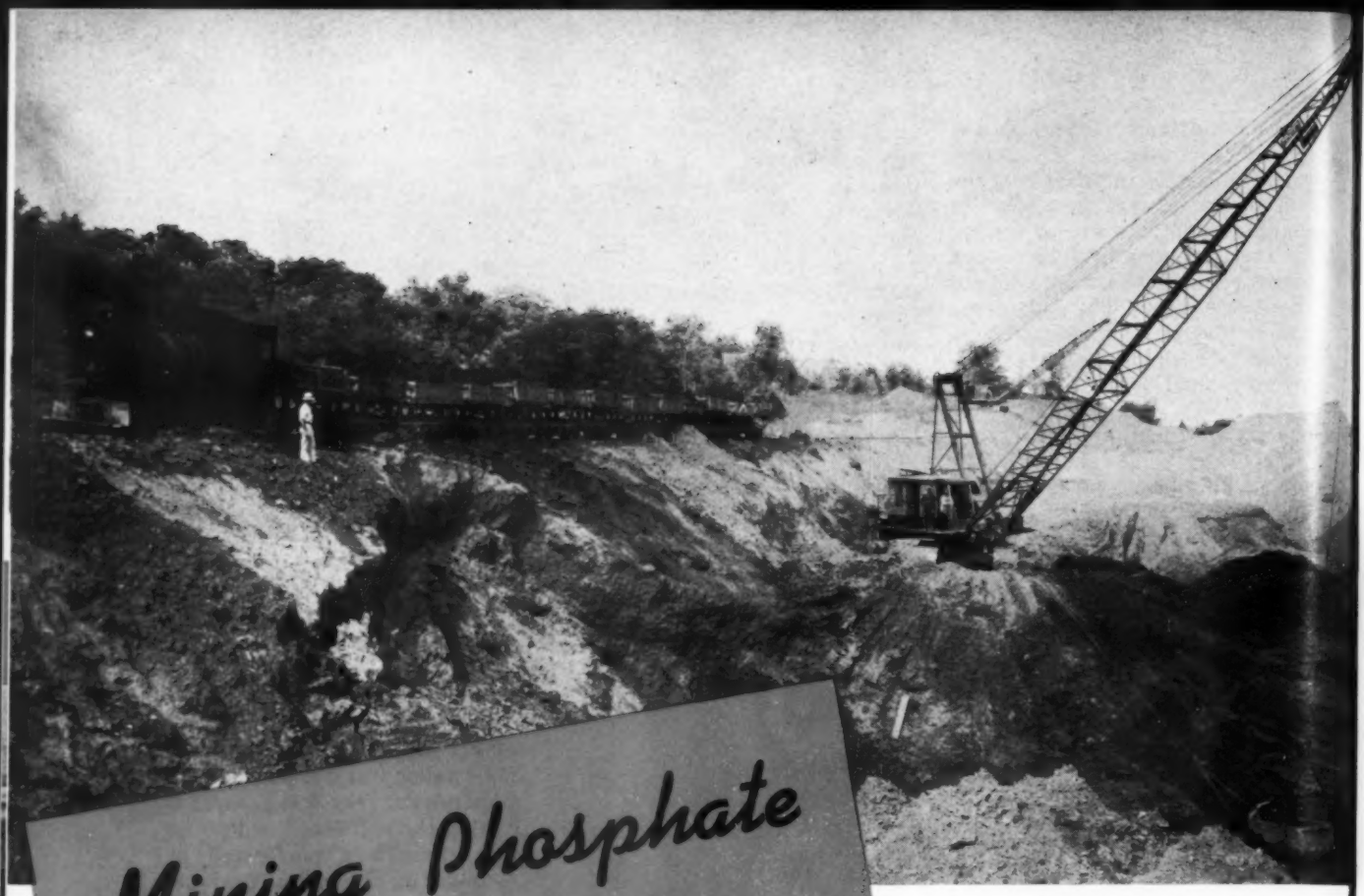
Immediately, then, the soil and cement was brought up to optimum moisture content of from 13 to 16%, depending on the soil, by adding water in several trips of a 2,500 gallon water truck. Uniform moisture delivery was assured by forcing the water out under pressure through a perforated bar sprinkler on the back of the water truck. A 4-cylinder gasoline driven

(Continued on page 224)

• Then, the strip is immediately rolled down by an 11-wheel, two axle pneumatic tire roller that kneads out all pockets in the surface.

• Final compacting is done by a 12-ton Buffalo-Springfield smooth roller. After this operation, the surface is covered, dampened and cured for seven days.





Mining Phosphate in Tennessee

International Minerals & Chemical Corporation have become specialists in the job of strip mining phosphate. Here's how they recover 300,000 tons a year in Tennessee

• Temporarily suspending its stripping duties, the Bucyrus-Erie 54-B at the Wales operation loads out phosphate rock to a waiting train.

THE MINING of iron, coal, and precious metals usually steals the spotlight from more humble brother minerals. However, these modest minerals are just as important in their own niche as their spectacular brothers and in many instances offer excavating problems as interesting as the best of them.

Stripping phosphate, one of the nation's most important nonmetallics, is just that kind of a job. This brown colored rock has become one of Tennessee's most important mineral treasures ever since men discovered that it made an excellent fertilizer for undernourished land. A secondary demand by the chemical industry for its use as an elemental phosphorous has also increased the market for phosphate rock.

One of the largest operators in the Tennessee phosphate field, which produces approximately one-fifth of the United States' annual output, is the International Minerals & Chemical Corporation, a Chicago firm also engaged in the phosphate mining business in Florida. Local headquarters for the corporation's Tennessee operations which produce about 300,000 tons per year are established in Columbia.

Mining 2,850 Acres

From here, under the supervision of John Norton, manager of the Tennessee operations, International Minerals & Chemical Corporation is mining phosphate deposits comprising an area of about 2,850 acres. There are two main deposits, one is near Mt. Pleasant, 11 miles southwest of Columbia, the other at Wales, which is about 30 miles south of Columbia. A complete washing and recovery plant has been established at each location to handle the final transformation of the brown-rock to pulverized phosphate ready for consumer use.

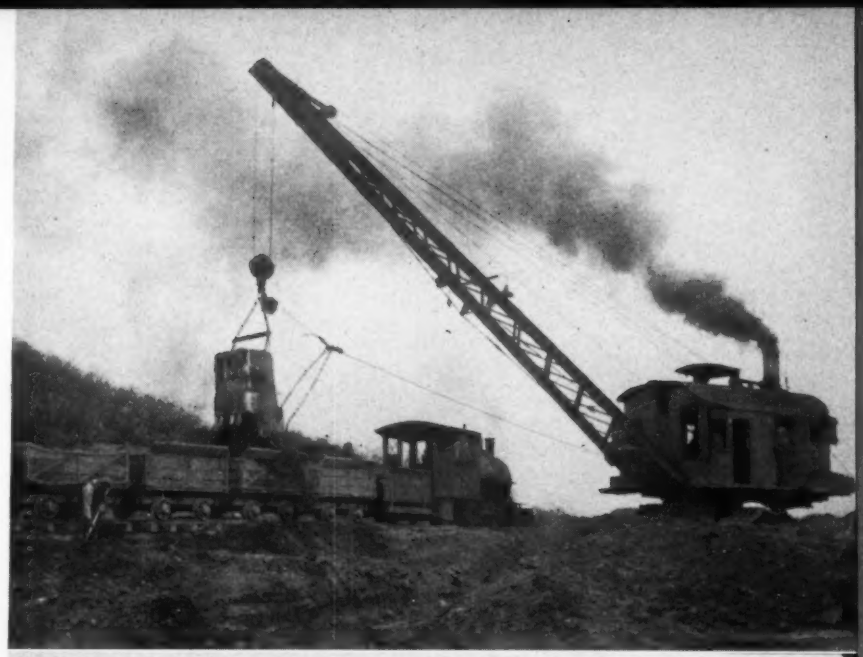
At the time of the writer's visit, an unusually long dry period had forced a temporary halt of the Wales operations as there was no water available for use in the washing plant. However, there was no shortage of water at Mt.

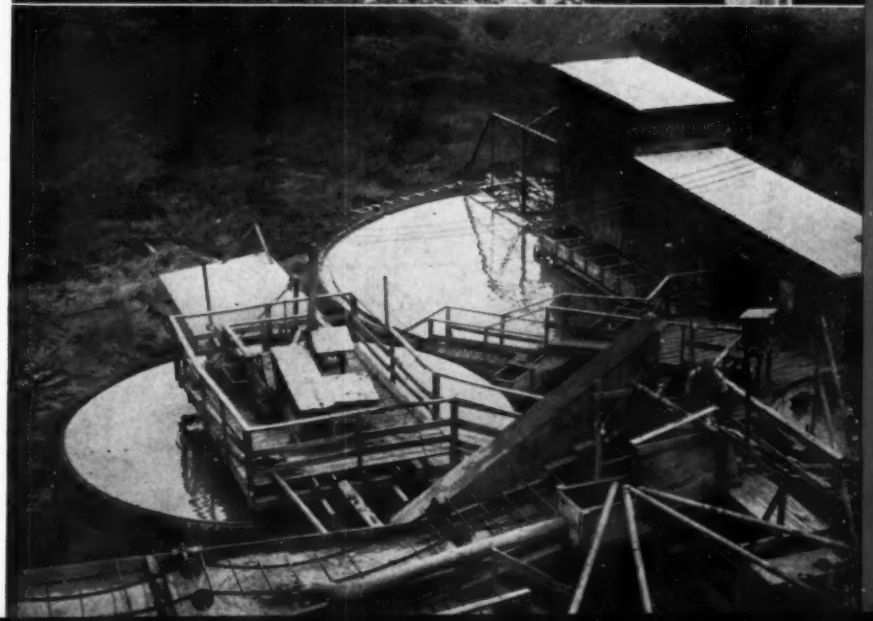
Pleasant and we found this operation in full swing. The phosphate mining, washing and recovery procedure is about the same at both locations, so our visit to Mt. Pleasant offered a good cross section of the company's phosphate mining operations.

The Mt. Pleasant area was prospected in the usual manner by a 4-inch Iwan hand auger. Drilled to depths of 30 to 40 feet down to lime rock, test holes were spaced on 50-foot centers. These operations have revealed that the loamy top soil overburden in this area varies from 2 to 20 feet, averaging about 8 feet. The phosphate deposit, or matrix as it is called, is found in depths of 2 to 15 feet and averages about 5 feet. Jagged pinnacles and irregular cutters rising from the limestone upon which the matrix rests present a constant problem to the economical excavation of the phosphate.

These rock "toadstools" rising through the matrix are the only reason for hand labor in an otherwise 100% machine operation, since the loose matrix in the irregular rock formations must be cleaned out by crews of men wielding hand shovels. Stripping and loading equipment at the Mt. Pleasant operations consists of a Bucyrus-Erie 54-B dragline swinging a 2½-yard bucket and three Marion No. 36 steam draglines equipped with 1¼-yard buckets. Most of the stripping is handled by the recently purchased 54-B which, according to Superintendent J. C. Schirmer, is "tossing aside overburden at a cost under two cents per cubic yard."

Averaging about 150 yards per hour, the 54-B works ahead of the Marion steam draglines whose duties are to load out the matrix to railway dump cars. Production of the Marion steamers is, of course, limited to the number of "toadstools" encountered and movements of the dump car trains. The steamers have reached





• Top: One of the company's Marion No. 36 steamers loads matrix to 3-yard dump cars at the Mt. Pleasant mine. Center: Waiting trains of dump cars are pulled up the washing plant incline one at a time and dumped. Bottom: A portion of the washing and separating plant.

• Jagged pinnacles of limestone rising through the matrix are a constant problem. C. J. Schirmer, superintendent of the Mt. Pleasant operations examines phosphate rock found at the bottom of a cutter.

a maximum of 93 yards per hour in good going.

Matrix Hauled by Rail

All hauling of the excavated matrix is handled by rail in 3-yard dump cars made up into trains 26 cars long. Three small 18-ton locomotives pull these trains from mine to a nearby gathering yard, where a 35-ton locomotive is employed to pull the cars for the rest of their 1-mile journey to the washing plant. Hauling track is shifted by crews with the aid of a LeTourneau 'dozer mounted on a Caterpillar tractor.

Superintendent Schirmer is adding about a ½-yard to the capacity of the dump cars by placing two 7½'x2"x10" oak planks at an angle on each side of the cars. Besides increasing the capacity, these side boards facilitate spotting and prevent spillage during loading operations by offering a larger target for the dragline operator. About 50% of the dump cars have already been converted in this manner.

Stripping and loading operations at Mt. Pleasant are usually on a one 8-hour shift per day basis, as this is enough to provide the washing plant with an average of about 350 cars per day. The mine is being operated on a 40% recovery basis, it being necessary to mine 2½ tons of the phosphate mineral for 1 ton of dried phosphate.

Handling an average of 550 tons, up to an occasional maximum of 700 tons, per 24 operating hours, the Mt. Pleasant washing, flotation, and drying plant takes the dark brown matrix from the dump cars and turns it into the final phosphate product ready for shipment to the consumer. Two-thirds of the plant's continuous 24 hour operation is devoted to treating the material mined in 8 hours on the Mt. Pleasant property, while matrix hauled in by truck from other nearby company properties keeps the plant busy the balance of its working time.

Washing Plant Operations

Matrix arriving in the dump car trains is pulled by a cable hoist up an incline, one car at a time, to a dump chute at the top of the plant. Here the car is end dumped over a grizzly. Each car is sluiced with water under 125 pounds pressure before it makes its return trip down the incline.

After dumping, the matrix is washed into a series of two 25-foot log washers located directly below the grizzly. Here, trommel screens sort the matrix from 3/16" to 1" size. Oversize is shunted to picking belts for further handling. Fine material not up to 73% phosphate content is corrected by a flotation process.

All material except that consigned to the flotation process is placed in a wet storage yard. An overhead crane swinging a 2¼-yard bucket feeds the wet storage material to the drying plant hopper. Drying is accomplished by two 50x40-foot Schofield dryers rotating at 11 rpm. The dried phosphate is elevated and delivered in a motor-driven dump car to a dry storage shed. From here a car-loading machine loads out the finished product in bulk to railway box cars and open gondolas.

As we have already stated, loading, stripping, and recovery operations at the International Minerals & Chemical Corpora-

• Below: Looking back over a mined out strip at Mt. Pleasant. The stripping dragline is at work in the background. Right: General view of the Mt. Pleasant matrix washing and separating plant.

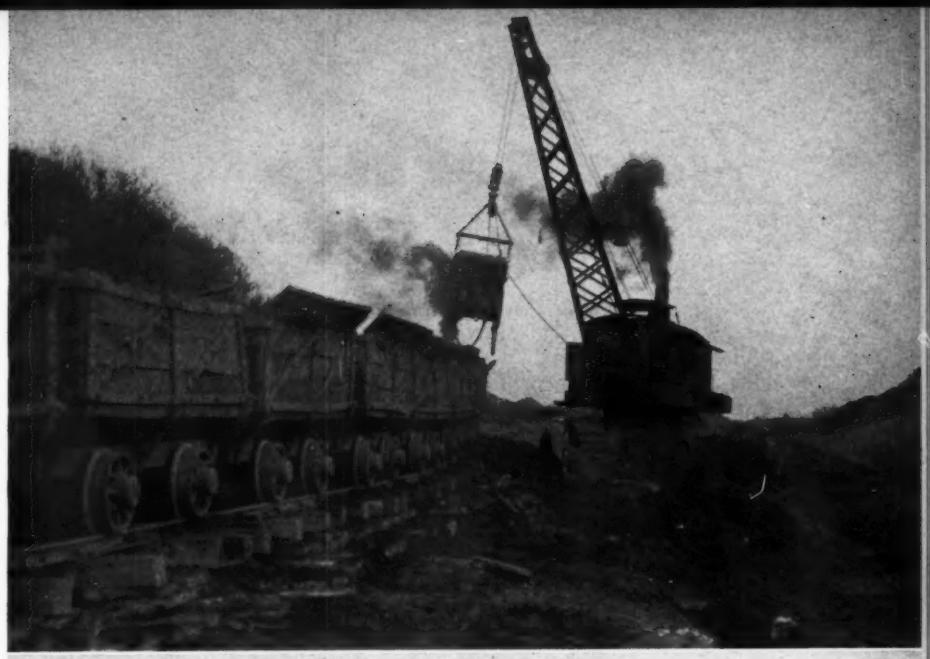
• Top: Marion steamer swings its 1¼-yard bucket over the dump cars. Note sideboard extensions on some of the cars. Center: Another carload of matrix is pulled up the washing plant incline. Bottom: Stripping operations at Mt. Pleasant are handled by this Bucyrus-Erie 54-B dragline swinging a 2½-yard bucket.

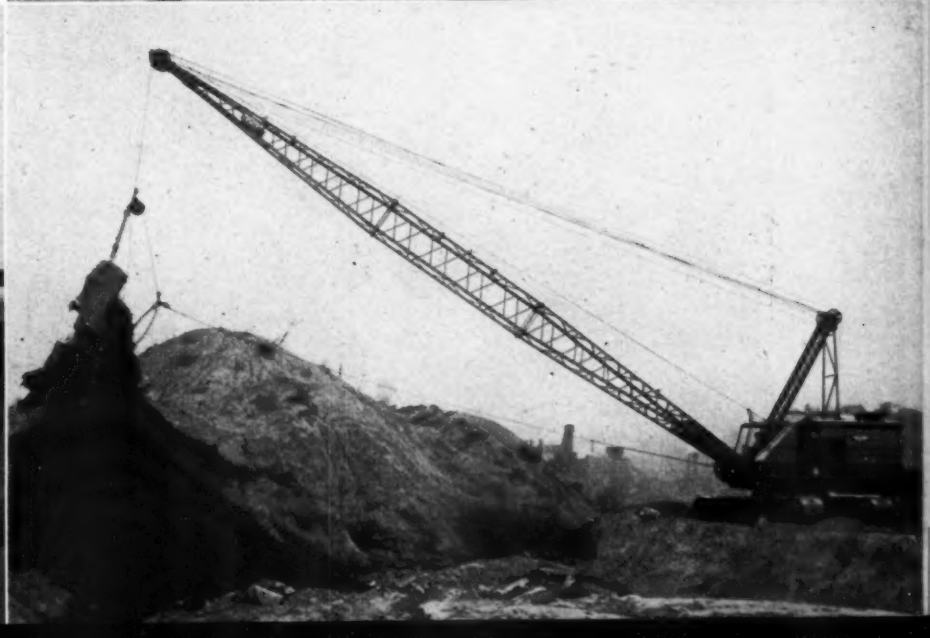
tion's Wales operation are almost identical. The excavating equipment at Wales consists of three Bucyrus-Erie draglines; a 2½-yard 54-B on stripping, a 1½-yard 52-B loading, and another 1½-yard 52-B doing various handling work at the washing plant. A Marion No. 36 steam dragline also pitches in for occasional loading work.

Every aggressive company points its sights a little ahead to get the jump on its everyday problems. Under the capable guidance of John Norton, manager of International Minerals & Chemical Corporation's Tennessee operations, the present crisis found the company engaged in a steady program of modernization. A major part of these plans is the ultimate substitution of trucks for the present rail haul method. Further modernization of its excavating equipment is also on the company's calendar.

Louis Ware is the president of International Minerals & Chemical Corporation and Franklin Farley as general manager of the phosphate division is in charge of the company's sales and phos-

(*Continued on page 198*)





Field NOTES

Wire Grade Line Is More Accurate

Days of adverse weather conditions plague excavation men all too often. Open cut and trench jobs require more pumping and things get pretty well "gooed up" in general, especially a linen grade line. Intermittent showers and sunshine cause the line to stretch and sag in accord with the elements. Old Jack Frost may add to the difficulty by alternate freezing and thawing as well to say nothing of the usual collection of bothersome hoarfrost.

By way of eliminating some of the troublesome checking and rechecking against the grade stakes to insure proper alignment, substitute ordinary brass picture cord for the conventional chalk line. Tie one end securely to the batter board on the center line and pass the free end through a small pulley that is hung on a center pin in the second batter board. A pair of old sash weights, or any other convenient object suspended from the wire will keep it taut at all times. While some checking will still be required to insure against shifting of batter boards, the grade line will require no further attention, except shifting forward as work progresses. —*Myron Carl*

Pouring Problem Solved

In constructing parapet walls along the top of a levee, a part of the job of lining the banks of the Los Angeles River, United Concrete Pipe Corporation, of Los Angeles, was confronted with the problem of transporting concrete in transit mixers along the top of a levee upon which there was no room for passing or turning.

To meet the situation, company engineers designed the special belt conveyor shown in the accompanying illustration. The conveyor is complete in itself, with a gasoline motor mounted in the center of the frame furnishing the power, and its total weight is only 1,200 pounds.

As each truck arrived, the conveyor was attached to a special fitting on the rear bumper directly under the mouth of the mixer. It can be set for any elevation, and can handle the four-yard batches of concrete in about eight minutes.

When the mixer was emptied, the conveyor was detached and swung clear by means of a hand hoist which hooked on either side of the conveyor frame to fittings located at the exact weight center so that the conveyor balanced when suspended. It took only one minute to detach the conveyor, and another to attach it to the next truck.

The empty trucks proceeded on down the levee and returned to the batching plant over another road. The walls averaged about six feet in height, eight inches in thickness at the top, and 28 inches at the base. Four 4-yard transit mixers were used to bring the concrete from the batching plant which was located about a mile away, and an average of 500 linear feet of wall was poured daily.—*John R. Marcy*

• **This specially designed belt conveyor solved the problem of transferring concrete from mixer to levee wall forms on a narrow levee road. United Concrete Pipe Corporation of Los Angeles developed this unit on a Los Angeles River job.**

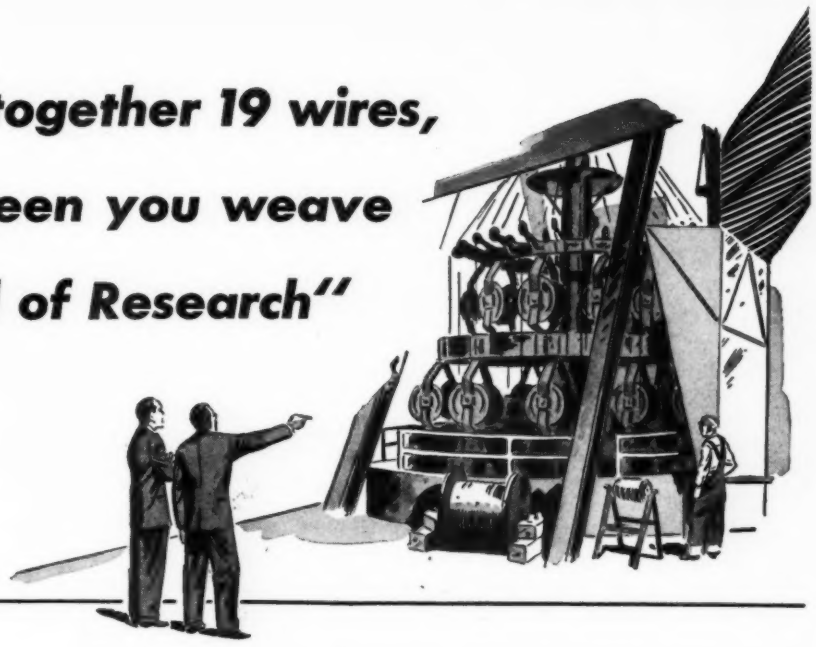
Gaskets for Locomotives

In many steam locomotives a gasket is needed for the steam dome, the steam chest at the throttle and other places. A great deal of leakage trouble can be avoided by taking ordinary No. 2 or No. 4 solid copper wire from the scrap pile. Roll this wire up in a bundle and heat in a fire to burn off the insulation, then allow to become red hot before throwing into a bucket of water. This softens the copper so that it is very ductile. The copper is then bent to the proper shape, round or square as desired and cut off with a butt joint. An acetylene torch can then be used to weld the two ends together, a rod of the same copper wire being used. This leaves an enlarged joint at the welding point which is then filed down to the same diameter as the wire, thus making a complete unbroken gasket of uniform diameter. This gasket is placed in the joint and when the bolts are tightened, the soft copper is forced into any small irregularities in the joint, making a perfect seal. With a little care such a gasket will give good service and last a long time. It is possible to re-use them, but it is easier and safer to make up a new one each time the joint is broken.—*K. B. Humphrey*

Majority of Roads Surfaced

Eighty-five per cent of all the roads on U. S. state highway systems have some kind of a surface and 62 per cent are "dustless or better." Many state road systems have been greatly enlarged by legislative enactment with little or no additional funds but the percentage of improved roads has remained about the same. Pavements of all kinds now constitute 32 per cent of all types of state highway improvement.

"You strand together 19 wires, and in between you weave the thread of Research"



Like the research that's responsible for this giant strander

"Many a job calls for 6 x 19 "Blue Center" Steel Wire Rope, but for those that don't, Roebling Research is ready with specialized facilities and materials. This giant strander, for example, can take as many as 46 tough steel wires, and accurately lay them into strand for pliable, high-strength, large diameter ropes, such as are used on mammoth dredges . . .

How strong is such a strand? If we want to know, this "tower of torture" will tell us. Another of the long arms of Roebling Research, it can pull apart a 4" wire rope to find its ultimate breaking strength. It also indicates how the rope will behave under *your* conditions and *your* loads . . .

But of course you know that a study of wire rope quality must cover more than breaking strength alone. That is why Roebling Research created the world's largest, most highly developed fatigue testing machine for wire rope—a giant laboratory in itself. In its 75-foot length it simulates many conditions that "Blue Center" Steel Wire Rope meets in the field, lets Roebling Research men study each condition carefully . . .

Thus the strong but invisible thread of Research is woven into every inch of Roebling "Blue Center" Steel Wire Rope. Giving it the extra stamina to meet the unusual load as well as the routine one . . . to give extra service where extra service is called for. Bringing it to the high standards it must pass, to carry the Roebling Trademark . . ."

Roebling Research, Roebling Engineering, Roebling Plant Facilities and broad Experience . . . each adds its part to the extra values in Roebling "Blue Center" Rope. Each helps it meet conditions unfailingly, wherever wire rope has a routine or unusual job to do.

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TRENTON, NEW JERSEY
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THAT'S THE ONLY WAY TO MAKE

ROEBLING

"Blue Center"

STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

For your convenience in writing to John A. Roebling's Sons Co., you will find a card bound in this issue.

Draining Cotton

Southwest Cotton Company of Arizona works out some neat ditch digging technique as it employs a tractor and 4-wheel scraper to excavate a drainage ditch 14 feet wide and 5 miles long

By FLOYD SUTER BIXBY

• Picking up a load in the 14 foot wide canal excavation, the scraper-tractor unit leaves behind a straight, clean-cut grade line. Careful initial cuts insure straight alignment.

DRAINAGE is an ugly problem. It usually entails the use of pumps, drain structures and hip boots. At best it is a muddy, messy job to keep machines on firm footing where levees are soft and the ground is worse. This is especially true in the removal of excess water from rich, closely packed agricultural land.

The Southwest Cotton Company of Litchfield Park near Phoenix, Arizona, has solved such a problem recently on its 15,000 acre cotton tract by making unusual use of a tractor drawn scraper. The secret of the method used is the perfect timing of the work to the weather. Under similar conditions of climate, even though soil characteristics were different, this method might well be successfully duplicated.

The 15,000 acre tract, now seasonally white with ripe cotton, was originally a part of the great Arizona desert. As such, its drainage was certainly adequate, for the soil then was sandy and more granular; and it was therefore easier for water to form seepage channels between the particles. It was exposed only to such limited rainfall as fell during the year.

When irrigation water and the seed for agricultural crops are applied to the desert, a rich dark humus soon shows up. The soil takes on a finer characteristic and is harder to drain. Very often, in a zeal to prevent crops from parching, excess water is applied during irrigation, and this must be removed. Each of these features in one form or another were met by the Southwest Cotton Company.

Since the company maintains a well regulated system of haul roads on its reservation, the use of a tractor drawn scraper seemed favorable, providing some system could be worked out to insure the necessary performance in relation to drain excavation. For no one can make guarantees regarding weather, even in Arizona. Officials of the company decided that the wet and dry weather cycles ran true enough to form that a drain-

• Southwest Cotton Company's 6-yard Bucyrus-Erie scraper, in the tow of an International TD-14 tractor, deposits excavated material along the levee of the five mile drainage canal.

...ds the Easy Way

age excavation program could be outlined for the dry part of the year, with not too great a per cent of rainfall guesswork involved.

This plan worked in very well with their cotton crop. Cotton is planted in March, making necessary the thorough drainage and cultivation of the fields prior to that time. The winter rainy season, ending usually in February, left a short period for adequate drainage and the preparation of the ground prior to planting the cotton. Irrigation then continues at intervals until September, when transient pickers harvest the fluffy bolls and send them to the gin. It seemed reasonable to assume, then, that drain excavation could be carried on to some extent from April to August, and continuously from August until the winter rains of January and February. Completed drain ditches would insure proper run-off disposal during the short period between the end of winter rains and planting time.

The first job of importance for the company to consider was the excavation of a completely new drainage ditch 14 feet wide at the bottom. The canal was five miles long, extending along the westerly limits of the vast acreage. It replaces a smaller drain lying nearby, parallel with the ditch. In the past few years the old drain was inadequate to carry off the water.

An International TD-14 Trac-TracTor with a Bucyrus-Erie P-24 power control unit was brought in and hooked up to a Bucyrus-Erie Model S-67 scraper. Operations were extended through a double shift and after a few days the tractor operators and company officials worked up a well regulated system in digging the big ditch. The job presented a good opportunity for studying firsthand the performance of the machines in operation and comparing the figures with tractor-scraper output on general construction work.

Excavation Procedure

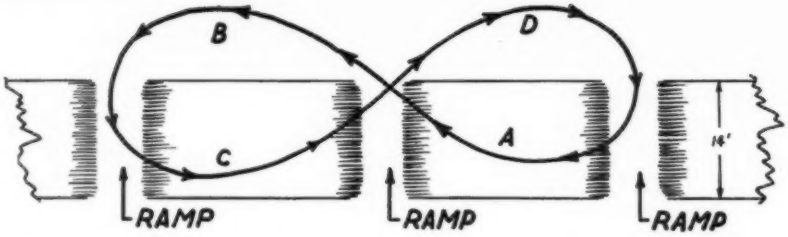
When the job was visited, nearly half of the canal had been dug. The soil, carrying about 15% moisture, was quite damp but fairly firm for hauling in spite of the moisture. Loading was generally done on a level grade, except that when the access ramps were removed a down grade of 6% could be utilized. The haul route was level with the exception of 80 feet of 6% rise in going up to the dump on the side of the canal. Considering the plentiful supply of inherent moisture and the friable soil characteristics, unload-

ing conditions can be classed as excellent.

The canal site was staked by surveyors who set their main location markers 30 feet off the center line on the side away from the cotton field. There was no danger on that side of their being knocked down, since the levee formed by the dumped material was laid on the opposite side between the cotton field and the canal. The ditch was started at the north end and carried toward the south, conforming with the natural slope of the surrounding country.

Access ramps every 350 to 400 feet were left until the canal between them was dug to grade. Initial cuts were always made by daylight to insure straight alignment, and canal excavation was also done as rapidly as possible during the light hours. Removal of the access ramps after the canal was finished was usually done before dawn or after sunset, using no lights except those on the tractor. Since the drainage gradient of the adjacent country was well defined simply by following the ground level (which sloped toward the south) it was possible to use a simple and foolproof system of grade determination. The canal was considered complete when the top of the tractor's crawler track was level with the original ground surface. At that stage it was about 3'3" in depth.

Initial stripping was light enough to be done as a part of the excavation and the few sparse weeds were dumped without harming the levee. A time study was run over a three hour interval by the writer in cooperation with D. R. Owen of the Southwest Cotton Company, disclosing points of interest characteristic in all phases of loading, hauling, dumping and returning for another load.



• This efficient excavation cycle did much to lower job costs. Position A indicates digging; B, dumping; C, digging; and D, dumping. Access ramps were spaced 350 to 400 feet apart.

Digging was done in low gear. Starting at the base of the ramp, the machine traveled an average distance of 138 feet before a heaped load boiled up into the scraper bowl. Since very little track slippage was noticed, and since the scraper was well loaded each time it left the cut, it seems fair to assume that the International TD-14 tractor, with a drawbar pull of nearly six tons in first gear, is of ample size to load scrapers of the Bucyrus-Erie S-67 class.

The load was hauled in sixth gear to the base of the out-going ramp. Third gear was used from that point until the load was deposited in a thin layer 90 feet long on the levee top. By dumping in a thin lift considerably greater compaction could be attained under the action of the Goodyear 9.00x20 Earth Mover tires on the scraper. Sixth gear was again used until the scraper was ready to load. Sometimes sharp turns at the ramps slowed down the work because it was necessary to go into a lower gear.

Scraper Performance Cycle

Service time, minor adjustments, lunch hours and operator fatigue at the end of the shift reduced the effective part of each operating hour by about 10 minutes. An average of 10.39 trips were made by the tractor drawn scraper per hour. A recapitulation is shown below.

The figures are especially interesting because they can be compared to the practical yardstick of completed job figures. One mile of ditch was dug in 11 days. This time, representing 220 working hours, shows an output of 41.9 cubic yards solid measure, per hour, compared to the performance study figures of 52 yards. Remember that the time study did not consider the reduced efficiency of the machines in the removal of ramps during hours of darkness. This gives us a well balanced statistical picture of the operation as a whole (41.9 cubic yards per hour) and a performance study of the most efficient part of the work (52 cubic yards per hour).

Scraper Cycle Time Study

Operation	Distance	Grade	Gear	Time
Loading	138 feet	Level	1st	1.50 minutes
Hauling (average)	400 feet	0 to 6% up	6th-3rd	1.43 minutes
Dumping	90 feet	Level	3rd-4th	.27 minute
Returning (average)	400 feet	0 to 6% down	6th	1.01 minutes
Turns			6th-3rd	.60 minute
Total cycle time				4.81 minutes
Trips per 50 minute hour				10.39

10.39 x 5 bank yards equals 52 cu. yds. per hour

Mining Phosphate in Tennessee

(Continued from page 193)

phate mining operations in Florida and Tennessee.

John Norton, manager and A. E. Clagett, assistant manager, head the company's Tennessee Phosphate Department. Edward G. Kraft, as general superintendent, is responsible for production and operating activities. The Mt. Pleasant operations are supervised by C. J. Schirmer, superintendent. Operations at Wales are captained by W. A. Kittrell, Jr., as superintendent.

Both operations call for the services of C. V. Harris, division engineer, J. R. Archer, chief chemist, John Francis, maintenance superintendent and C. A. Irwin, division purchasing agent. M. L. Clement is chief accountant for the division.

3 ways to make your Wire Rope dollar go farther...conserve steel tonnage too

(No. 9 in a series of informative articles for wire rope users prepared by the Macwhyte Wire Rope Company. Previous articles in this series are available on request on your company letterhead.)

1 Buy PREformed; it's best, costs less

There have always been sound reasons for buying PREformed wire rope. Careful tests time and again have proved it gives better service than non-preformed, costs less in the long run, saves time because fewer shutdowns are necessary for replacements.

Fig. A—PREformed ropes are free of internal stress, have high fatigue resistance.

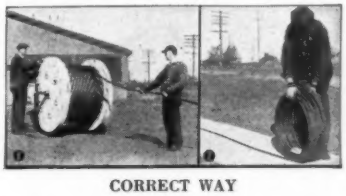
Today there's another reason why it's most important to buy PREformed: by doing so you help national defense.

It takes just as long at the steel mill to make steel for non-preformed as for PREformed wire rope. Yet PREformed will outlast ordinary wire rope on most jobs. When you buy Macwhyte PREformed, therefore, you're helping conserve not only steel which America greatly needs, but also the time of those who make it.

2 Install Rope Carefully

It's so easy to kink or twist rope when installing in a hurry. Such "haste makes waste." Kinking and twisting definitely shortens rope life.

With reasonable care and speed you can prevent both. Here are some simple suggestions on unreeling and uncoiling rope . . . operations where both kinking and twisting are apt to occur.



CORRECT WAY

Unreeling—The reel should be revolved and the rope taken off the way it is put on the reel. Illustration No. 1 shows one method—put a shaft through the center of the reel and jack it up so that the reel will revolve freely. Pull the rope straight ahead, keeping it taut to prevent it from loosening up on the reel. A board held against one flange may be used as a brake to keep the reel from revolving too fast.

Uncoiling—Roll the coil along the ground so the rope lies straight as shown in Illustration No. 2. There will be no twist or kink in the rope if these instructions are followed.

INCORRECT WAY

Illustrations 3 and 4 show incorrect ways of unreeling and uncoiling. Notice that the reel and coil cannot revolve and therefore the rope is twisted as each turn is taken off.

3 Inspect Your Ropes Regularly

Once wire rope is on their equipment many users overlook the value of regular inspection. Such negligence is costly. It can be avoided by regular inspection which takes far less time, is much less expensive than too frequent buying and replacing for lack of knowledge of their condition.

Pictured here are a few of the most common "Wire rope enemies" which, if *not* eliminated or kept under control, can easily reduce the service life of your rope as much as 50%. Also given here are suggested methods of avoiding these dangers.

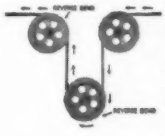


Fig. B—*Reverse bends*—Years of experience and many tests have proved that reverse bending and excessive wire fatigue reduce rope life as much as 50%.

Where reverse bending cannot be eliminated, use the largest sheaves possible and place them as far apart as possible. By getting the MAXIMUM distance between reverse bends, you reduce fatigue—provide longer service.

Fig. C—*Sheaves too small.* This rope was forced to travel continuously over sheaves whose diameters were too small. Frequent inspection would have shown this danger. A change to a larger sheave would have solved the problem. (Note: PREformed wire rope would have lasted much longer in this case.)

Fig. D—*Drum abrasion* and abuse caused this. The rope was scuffed over and over against previous wraps on a flat-faced drum. This could have been prevented by even winding and grooved drums.

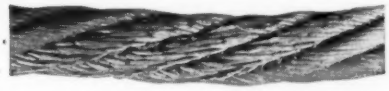


Fig. E—*Kinking* caused this. This dog-leg, or kink, was finally straightened out . . . but notice the uneven wear at the point where the kink had been. Proper handling during installation could have prevented this. Beware of dog-legs! They're expensive.

Why Guess? When you can KNOW!

Macwhyte Company wants you to know that they will be glad to offer recommendations of the correct ropes for your equipment and, if you like, discuss with you possibilities of getting more from the ropes you are using . . . should there be any doubt in your mind as to whether you are getting the best service.

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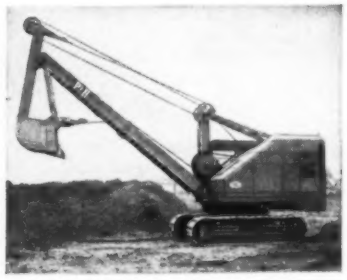
Equipment you ought to KNOW ABOUT

For further details about the equipment on this page please write to the manufacturer, mentioning Excavating Engineer.

Dragshovel

Manufacturer: Harnischfeger Corporation, Milwaukee, Wisconsin.

Claims: With many refinements of design from crawlers to boom, the new P & H 655-A dragshovel points to improve dragshovel performance in its range. Fast digging with ease is accomplished by a newly developed gear-driven booster device with positive pri-



mary chain drive. The dragshovel is equipped with a 1½ yd. dipper and has a digging depth of 22 ft.; a 35-foot reach and a dumping height of 16 ft. A low-pressure hydraulic system is used for control. The 655-A is of all-welded alloy steel construction.

Scraper hauler

Manufacturer: Sullivan Machinery Company, Michigan City, Indiana.

Claims: A compact scraper hauler suitable for small jobs or in close operations; for handling ore in preliminary rounds of sublevel drifts; short clean-up jobs and many other similar jobs formerly done by hand. The unit is 27 inches long and passes through a 12 x 14 inch opening. It weighs 250 pounds and is a one-man machine for most operations. A speed of 125 feet of rope per minute is developed through the patented "Turbinair." The rated rope pull is 1000 pounds.

Boom bucket

Manufacturer: Ransome Concrete Machinery Company, Dunellen, New Jersey.

Claims: The new design permits the bucket doors to be opened or closed to any degree at any position on the boom, permitting the entire drum batch to be discharged into the bucket which means an all-around time saving. Thus, any amount of the bucket load may be deposited in any place within boom reach. All inside and outside levers, arms, etc., have been eliminated and the boom bucket carriage has no operating parts requiring adjustments or repair. The elimination of these parts reduces the weight. The bucket doors slide open instead of dropping which provides a clearance from the ground of 23" with the doors open, and 21" when closed—adequate to clear strike-off devices or other obstructions.

Wagon drill

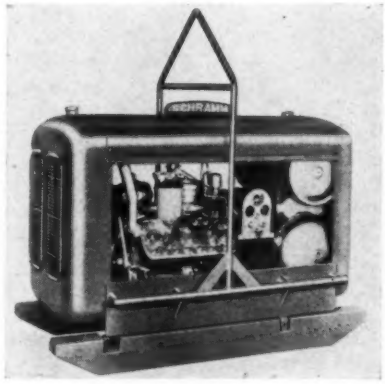
Manufacturer: The Cleveland Rock Drill Company, Cleveland, Ohio.

Claims: This machine drills holes in any direction, and to a depth of 25 feet or more. Improvements over previous models consist of: Two jack screws geared together for raising and lowering the U-bar and feed mechanism, making smoother and easier action; improved guides for the drifter and slabback mounting for same; improved centralizer and further refinement in main features such as the controls and the drifter itself.

Air compressor

Manufacturer: Schramm Inc., West Chester, Pennsylvania.

Claims: A semi-portable air-compressor with special skids and lighting bale that includes shackle bolt fittings attached to frame, with removable wood skids for mounting on chassis, trailer, truck



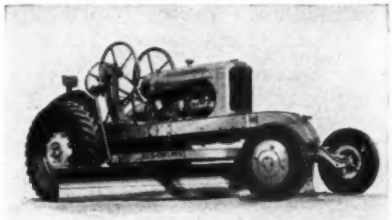
or base; welded hand rail and lifting bale for easy handling so the compressor can be lifted by crane, hoist or man-power. The unit has a capacity of 60 cubic feet of actual air delivery per minute at 100 lbs. gauge pressure. With a Mercury V-8 engine, 4 cylinders are used for power and 4 are used for compressing air, thus eliminating all belts, chains and gears or other forms of transmission.

Hot-poured sealer

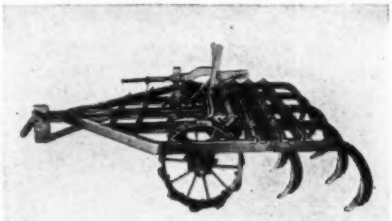
Manufacturer: Servicised Products Corporation, Chicago, Ill.

Claims: A product that completely waterproofs any crevice or joining of two sections of concrete slabs. It is known to the trade as Para-Plastic Compound. It liquifies readily on heating and

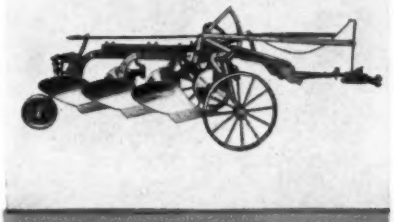
Heavy-Duty Tools That *"Stand the Gaff"* ON SOIL-CEMENT STABILIZATION



Model W-Speed Patrol for pulling-in edges, shaping and finishing. 10' blade, hand control.

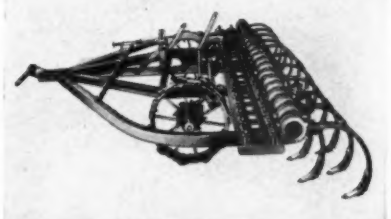


Extra heavy weight chisel for light ripping, mixing and pulverization. Depth control.

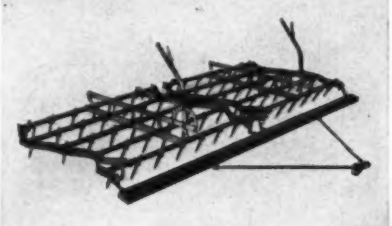


A-C high speed plows provide good mixing action and assure uniform sub-grade.

A-C sub-grader scarifies hard surfaced roads and maintains level sub-grade. Depth control.



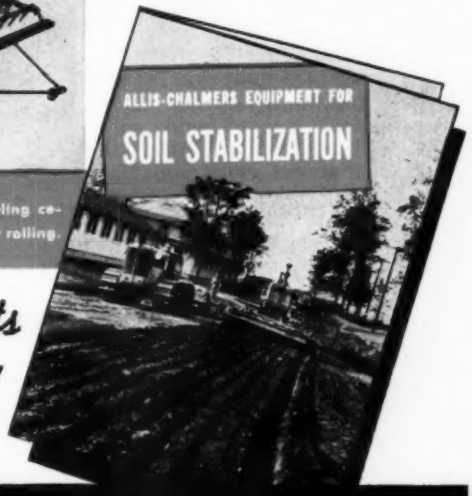
Big, heavy-duty, soil-cement mixer with flexible coil shank teeth. Depth control.



All-steel spike tooth harrow for leveling cement and producing surface mulch for rolling.

Extra heavy, offset disc harrow for pulverization and mixing. Easy turning, depth control.

Here are the kind of tools you need for soil-cement stabilization —long-wearing ... tough ... powerful ... economical! Tools that have had years of service under the most difficult conditions on every type of soil. Tools that have proved they can handle any soil-cement mixture in stride —loam, clay, sand or gravel. A wide selection ... from one source! One supplier ... one service! Rippers, chisels, discs, scarifiers, plows and spike tooth harrows, for pulverizing, rooting and mixing ... in addition to sheep foot tamping rollers, water spreaders, motor graders, wheel and crawler tractors for compacting, watering, grading and drawbar work! For complete information write for booklet: "Allis-Chalmers Equipment For Soil-Stabilization."



Get all the facts

Write for this new booklet ... "Equipment For Soil-Stabilization."

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can be poured, set and ready within the hour. It is not affected by cold or heat. This plastic seal bonds firmly with concrete and maintains a perfect seal under all conditions of expansion or contraction of the concrete slabs. It has been known to extend to ten times its original thickness.

Protective lighting fixture

Manufacturer: Goodrich Electric Company, 4600 Belle Plaine Avenue, Chicago, Illinois.

Claims: Due to its elliptical shape, the new light fixture provides a wide lateral distribution of light. The unit which fills a definite need for protective illumination around industrial plants, conforms with F.B.I. specifications. With proper spacing of the fixtures a brilliant barrier of light is created around property lines without illuminating buildings and grounds. Watchmen remaining in darkness can instantly spot the entrance of any intruder into the brightly lighted boundary. With the low mounting height, lamps of from 300 to 500 watts deliver a high intensity of illumination.

Blackout bulb

Manufacturer: Wabash Appliance Corporation, 335 Carroll St., Brooklyn, New York.

Claims: Designed for blackout lighting during air raids, this new bulb provides down lighting in a soft beam of blue light that is safe for indoor visibility during blackouts. The bulb is lined inside with a pure silver reflector lining that hides all filament glare and projects the light downward. Light leaks are prevented by a black silicate coating that covers the bulb to the illuminating end which is a deep blue.

Cleaning stone

Manufacturer: Ideal Commutator Dresser Company, Sycamore, Illinois.

Claims: Film and dirt caused by heavy, continuous power loads can be cleared from commutators quickly with this cleaning stone. The stone cleans while the motor or generator is running. It is used by simply holding it against the commutator and slowly moving across the face. It does not clog nor cut the commutator. The use of the stone will also improve brush performance, reduce noise and sparking.

Rock drill

Manufacturer: Ingersoll-Rand Company, Phillipsburg, New Jersey.

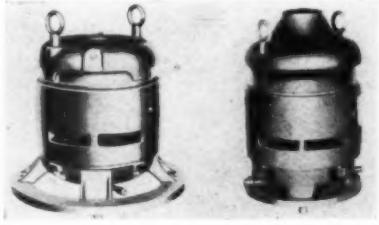
Claims: The efficiency of the D-505 drifter, based on inches drilled per cubic foot of air at 90 pounds pressure, is 34% greater than previous 4"-bore machines, and 52% greater at 70 pounds pressure. The wall section of the front head is 10% thicker than that of previous 4" drifters. The

shank aligner is 18% longer and 8% thicker and an improved chuck design of heavier construction has been included. The drill employs a sturdy rifle bar which makes possible strong rotation. The rifle bar pawls are reversible for longer life. Operators will find that the throttle handle is more readily accessible.

Electric motors

Manufacturer: General Electric Company, Schenectady, New York.

Claims: Three motors—a vertical general-purpose polyphase mo-



tor, a vertical shielded polyphase motor (1 to 20 hp) and a vertical shielded single-phase motor (1 to 5 hp) have been added to the G.E. series. The shielded-type motors are especially suited to pumping applications, and the general-purpose motor is suitable for use in agitators, mixers as well as the machine tool industry and similar applications.

Water purifier

Manufacturer: Sudbury Laboratory, South Sudbury, Mass.

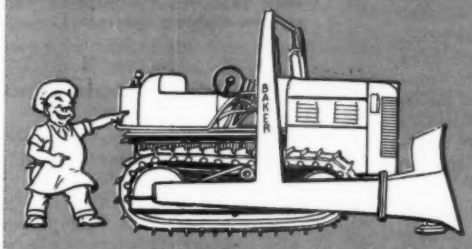
Claims: A new product which prevents rust and provides clear water from any metal tanks or pipes and from lead, brass, or black, galvanized or cast iron water systems. The product, Aqua-Clear, also clears out loose rust from old, rusty tanks and pipes. The cheapest metal water systems are made permanent so far as internal rust or corrosion is concerned. It is a clear, tasteless, harmless liquid which is added in minute quantities to the water as it is put into the system. The amount required to prevent rust is one ounce to each 100 gallons of water. Somewhat larger quantities are required for the removal of old loose rust. It is also valuable for stopping further deterioration of old tanks, postponing replacement almost indefinitely.

Shop truck

Manufacturer: The Buda Company, Harvey, Illinois.

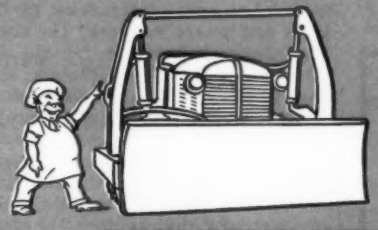
Claims: This new industrial shop truck weighs only 800 pounds, is speedy with quick acceleration foot throttle speed control. It handles easily at all speeds. Maximum speed 15 m.p.h. It is driven by a powerful low maintenance 4-cycle air cooled 7.7 h.p. engine. The engine averages 35 to 38 miles per gallon of gas. Magneto ignition is used for starting. The truck is provided with a heavy duty friction drive with both forward and reverse speeds and neutral position for idling. It has a loading space of 12.8 square feet. The frame is of electrically welded steel with anti-skid steel deck and a heavy metal engine housing. The brake is of an internal expanding type on an intermediate shaft and is applied by standard brake pedal. An outstanding feature is the brake, automatically applied the instant the operator leaves the seat. The machine will not operate when the driver is off the seat.

You can depend on Baker Hydraulic Bulldozers in the tight spots!



EASIER TO OPERATE!

No levers to shove or tug—no twisting around—one small handle gives you fast, smooth action. 4 positions in logical order—"Float," "Down," "Hold" and "Raise"—it's simple, it's easy, it's faster!



GREATER STABILITY—SAFER!

Baker's are not dependent on the tractor to hold them together. Overhead brace prevents torsional strain and protects operator against falling trees and in case of upsets. Cylinders are up away from the mud, dust and dirt. Better visibility!

Baker's faster, more positive, direct lift and down-pressure is a natural for tight spots like this job—leveling around piers on a new War Department Building—Potts & Callahan, Contractors. That hair trigger action is just what is needed for most other grading, leveling, backfilling and earth moving jobs, too—in close quarters or out in the wide open spaces.

Baker's are helping Uncle Sam out of a "tight spot" by doing the bulldozing and grade-building with a minimum of fuss and maintenance on scores of war program jobs. War or peace, you can make the most of available horsepower with a Baker on your tractor front end.

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LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

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Shots from the FIRING LINE

AGCA Devotes Convention to War Construction Plans

The twenty-third annual convention of The Associated General Contractors of America was devoted primarily to the development of means for the most efficient use of all types of general contractors throughout the country in war and civilian defense construction.

At the convention in Indianapolis, February 16 through 18, during which all sessions were heavily attended and charged with intense interest on the part of all present—the speakers, the reports of officers and staff, and the discussions by contractors from all parts of the country examined the problems of war and post-war construction.

Highlights of the convention, as summarized by retiring President M. W. Watson, of Topeka, Kansas, were:

1. A unanimous pledge of full support of the association and its members to the war effort.

2. A demonstration of the feeling by contractors that they could be performing war construction in greater volume if the work were made available.

3. A finding that government officials in charge of construction should determine the type of contract to be used, but it was the duty of the industry to advise on contract procedures which would permit maximum use of all units of the industry.

4. The urging of continued cooperation of government officials and organized labor for the stabilization of wages and working conditions in the war program.

Official actions of the convention were taken in the resolutions. A resume of the more important resolutions follows:

"Firmly convinced that if this war is to be prosecuted to an early conclusion all private industry wherever practicable and possible should be mobilized under industrial leadership" the convention offered "the services and facilities of all its members in all localities to the national government and urges the fullest possible immediate use be made of them."

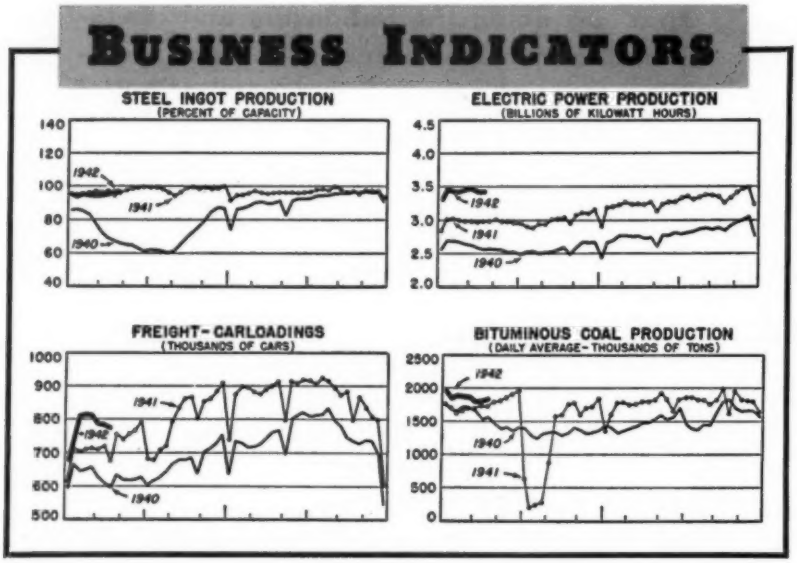
Regarding construction contracts, the convention resolved that "Those charged with the responsibility of determining government policies in matters of the type of construction contracts should be guided solely by consideration of speed in the completion of structures for the use of the combat services and of manufacturing agencies."

Concerning the "architect-engineer-manager" form of contract being adopted under certain circumstances by the Corps of Engineers, another resolution stated that whereas "completion within a comparatively short period of time and under stress definitely involves and requires the accumulated managerial experiences inherent in the general contracting business, including the ability to secure, at proper prices, materials, equipment and sub-contracts, and to efficiently assemble and coordinate labor and construction facilities when and where required" the convention recommended that "in the event that government departments should elect to use the so-called A. E. M. type of contract on some particular projects, the government departments should be advised of the advantages to them of insisting that a qualified general contractor be a prime party to the A. E. M. contract, and that as such the general contractor be charged with the management of the entire construction operation in the field."

Observing that the OPM-AFL construction trades stabilization agreement had been in effect on the majority of defense work for six months during which time the industry had made a "remarkable record of uninterrupted work during war conditions" the convention resolved that "the building and construction trades department of the A. F. of L., the labor division of the War Production Board, the War and Navy Departments, the Federal Works

• Lambert & George, Montpelier, Vermont, employ a Lorain ½-yard dragshovel for drainage work on their $250,000 Hardwick to Morristown highway contract.

BUSINESS INDICATORS



Agency, the Maritime Commission and the Defense Plant Corporation be commended for their increasingly successful efforts to avoid work stoppage caused by disputes and to stabilize wages and hours of employment on those defense construction projects employing AFL workmen and administered by those agencies" and resolved that the agencies and labor organizations "be urged to continue their efforts to accomplish further adjustments and stabilization of labor policies to meet the construction requirements which develop as the war effort increases; and that the Labor Relations Committee and the national staff of the association continue to cooperate with the stabilization effort."

Among the speakers who addressed the convention were: Major General Eugene Reybold, Chief of Engineers, U. S. Army; Commander Vernon R. Dunlap, representing Rear Admiral Ben Moreell, Chief, Bureau of Yards and Docks, U. S. Navy; and W. V. Kahler, Chief, Construction Branch, Production Division, War Production Board.

Dan W. Kimball, president of the Owens-Ames-Kimball Co., Grand Rapids, Michigan, was elected president for the coming year. Oscar B. Coblentz, president of the McLean Contracting Co., Baltimore, Maryland, replaced Mr. Kimball as vice-president. E. M. Rust, vice-president of the Rust Engineering Co., of Washington, D. C., was re-elected secretary-treasurer.

New occupational division officers were also elected. William Muirhead, of Durham, North Carolina, was elected chairman of the Building Contractors' Division, and P. M. Fogel, of Kansas City, Missouri, vice-chairman. J. H. Pittman was elected chairman of the Highway Contractors' Division, and W. P. Roscoe, of Billings, Montana, vice-chairman. L. C. Rogers, of Chicago, Illinois, was elected chairman of the Heavy Construction and Railroad Contractors' Division, and A. Teichert, Jr., of Sacramento, California, vice-chairman.

William W. Gray

News of the death of William W. Gray, president of the Blackfoot Coal Corporation of Evansville, Indiana, comes as a shock to his many friends in the industry. Mr. Gray died of a heart ailment in a Rochester, Minnesota, hospital on February 18 at the age of 77.

Since an illness of pneumonia last March, Mr. Gray had been ill but his condition had only been serious about a week.

Born in Grayville, Illinois, he started his business career as a messenger in the town's First National Bank of which his father was president. Upon his graduation from Notre Dame University he became more active in the bank's affairs and succeeded his father as president.

In 1910 Mr. Gray moved to Evansville to become associated with his brother Allen in the Indiana Tie Company, railway tie manufacturing company firm. Upon the death of his brother Allen, who had been president of the Citizens' National Bank of Evansville, Mr. Gray was chosen to take over these presidential duties in 1920.

At the time of his death Mr. Gray's colleagues published a memorial resolution of which the following is a portion:

"While his abilities, intellect and philosophy of hard work and things worth while had made him pre-eminently successful and there was no need for him to continue his labors, he refused to retire and, although ill for some months, he steadfastly continued, as he wished to do and with that determination that was his and without thought of himself, the active and predominant leader, up until the very time of his death, in the world of work and business in which he was a master.

"It is seldom indeed that the Board of Directors of any institution is accorded the privilege of association with a man like Mr. Gray. His steadfast loyalty to, and his unvarying and kindly thoughtfulness of, those who were associated with him in his many business affairs, constitute an example worthy of emulation by all. As a leader, counselor and, above all, as a true friend, his memory will ever be gratefully cherished as long as any who knew him may live.

"His strength of character, his integrity and his high sense of honor, among the many other attributes which endeared him to those who had the good fortune to be associated with him, will always afford a noble inspiration. His outstanding personality, great spirit and strong Christian character will live on forever in the minds and hearts of all those who were touched by the great power of them."

Mr. Gray is survived by his wife, Birdie, and three daughters: Mrs. Charles C. Kerwin of Lake Forest, Illinois; Mrs. Thaddeus L. Up de Graff and Mrs. Frank E. Browne, of Los Angeles, California.

Walter L. Haehnlen

Walter L. Haehnlen, president of the Tonopah Mining Company and president and director of the Tonopah and Goldfield Railroad, died March 5 in Philadelphia, Pennsylvania, after a week of illness. He was 66.

Mr. Haehnlen was a native Philadelphian. He was educated in the city's public schools and at the University of Pennsylvania. For several years he was a member of the investment firm of Charles Fearon & Company, which went out of business a number of years ago.

He was vice president of the Giant Portland Cement Company and the Huntingdon and Broad Top Mountain Railroad Company, and a director of the Tonopah Corporation, the Vertex Mining Company, the Tonopah Canadian Mines Company, the American Mining & Investment Company, the Northern Liberties Gas Company, the Iowa Public Service Company, the Peoples Railway Company, and the American Railways Company.

Surviving Mr. Haehnlen are his wife, Mrs. Florence Holt Haehnlen, and two sisters.

Heavy Rock Excavation At San Vicente Dam

By Floyd Suter Bixby

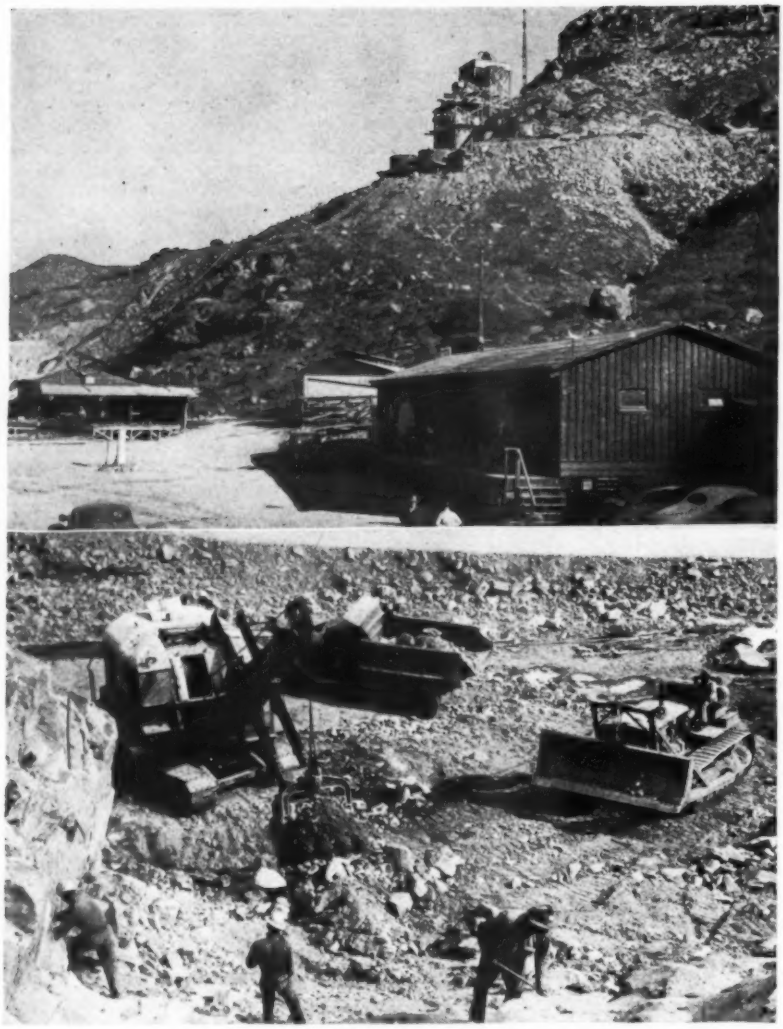
Deep in San Vicente Canyon, 20 miles northeast of San Diego, California, the contracting firm of L. E. Dixon of Los Angeles is handling some mighty tough rock excavation. San Diego granite and heavy, hard diorite is being blasted and shoveled out of the rock walled canyon to make a keyway in which concrete for the big structure will be poured. There are 100,000 pay yards of rock, and drill bits sometimes dull in three inches of travel. That will give you a general idea of the job.

San Vicente Dam is a straight mass concrete gravity type structure, designed by the city of San Diego as a part of its long range water supply program. The city in building the dam is looking ahead possibly five years towards a time when the supply of San Vicente creek water impounded behind the dam will be necessary to sustain the increasing population.

The Dixon Company began work on the rock abutments soon after the $2,000,000 contract was awarded in October, 1941, and they hope to finish within two years. Excavation involved only one big problem; and that problem was "excavation" used as a generic term.

In order to build access roads up to the top of the key trench and to reach the site of the head and tail cableway towers hundreds of feet up off the river bed, it was necessary to drill and shoot every cubic yard of rock in the access roads. These roads were literally chiseled in solid rock and the debris removed by a 1½-yard Lima shovel working high up on the bench. The 20-ton Lidgerwood hoisting engine and the 25-ton cableway towers were jerked and tugged by brute force up the mountain roads by two D-8 Caterpillar tractors. Structural steel for the Noble batch plant was sent up in very much the same way and set by a Lorain 40 Moto-Crane.

Excavation for the rock keyways began at the topmost points where cuts were narrow, and continued in a widening angle down the mountainside. In general, the concrete will be keyed ten feet into solid rock, and it is the removal of this rock which is so difficult. Sometimes a driller will use as many as



• Top: L. E. Dixon's batch plant at San Vicente Dam is perched on the dam's left abutment high above the camp headquarters. Below: A 1½-yard Lima, assisted by a 'dozer, cleans up a rock cut at San Vicente.

100 bits on one 16-foot hole. The hardness of the rock varies so much that bits last through a range of from two inches to 10 feet. An average of 350 of these bits are repointed every eight hours by two Gardner-Denver mechanical sharpeners in the blacksmith shop.

Air for the ten upright Ingersoll-Rand drills and the twenty Ingersoll-Rand JB-5 jackhammers is being furnished by a battery of five Gardner-Denver 365 cfm compressors and a diesel driven Sullivan angle compound machine. The pneumatic power is piped up to the work. Holes are being loaded with a pound of 40% gelatin per cubic yard to insure thorough fracturing of the stone. Shots are generally limited to 2,000-4,000 cubic yard volumes because the cuts are comparatively shallow and the loading shovels are always hungry for a new rock supply.

A Koehring 801 machine and a 1½-yard Lima divide the digging honors between abutments. The machines are each loading out about 50 cubic yards per operating hour into a fleet of nine GMC and International 6-cubic yard dump trucks. Excavated rock is being wasted ahead of the dam, involving only a short haul from the shovel.

W. N. Evans is general superintendent, C. P. Williams is resident engineer, and "Slim" Conley is the man who keeps the excavation rolling.

Army is Developing "Flight Strip" Program

By Bethune Jones

Inauguration by the U. S. Federal government of a "flight strips" construction program which will dot the entire country with auxiliary landing areas was revealed by Lieut. Col. Stedman S. Hanks of the Army Air Forces in an address at the 18th annual convention of the Association of Highway Officials of the North Atlantic States, held February 25-27 at the Benjamin Franklin Hotel, Philadelphia, Pennsylvania.

Colonel Hanks, who is the originator of the so-called "Hanks Plan" for the establishment of "flight strips" adjacent to public highways, and who has been designated head of a "flight strips" unit set up within the Army Air Forces, did not indicate to what extent the work had progressed. He said that construction was being carried out by the Public Roads Administration, in cooperation with the Army Air Forces.

"Flight strips," he told the 1,000 delegates, are vitally needed to "furnish dispersal points for aircraft, to alleviate the crowding of our main air bases and lessen the risk of large-scale bombing losses caused by excessive concentration of aircraft."

They also will provide hopping-off points for fighter planes defending this nation's coast lines, he said.

Colonel Hanks explained that legal basis for the "flight strips" program is found in the Defense Highway Act of 1941, which carried an authorization of $10,000,000 to be used in addition to funds available from any source. He added that $5,000,000 of this authorization was appropriated on December 17 for immediate use.

Construction of "flight strips" in most instances will involve little more than widening of highway rights-of-way or use of roadside development areas and establishment of a definite line of demarcation between highway and "flight strips," he said. The length of the runway may be 3,000 to 8,000 feet, depending on the elevation of the ground above sea level and the type of aircraft for which it may be intended. The actual runway width may not be more than 150 feet, with a minimum cleared width of 300 feet.

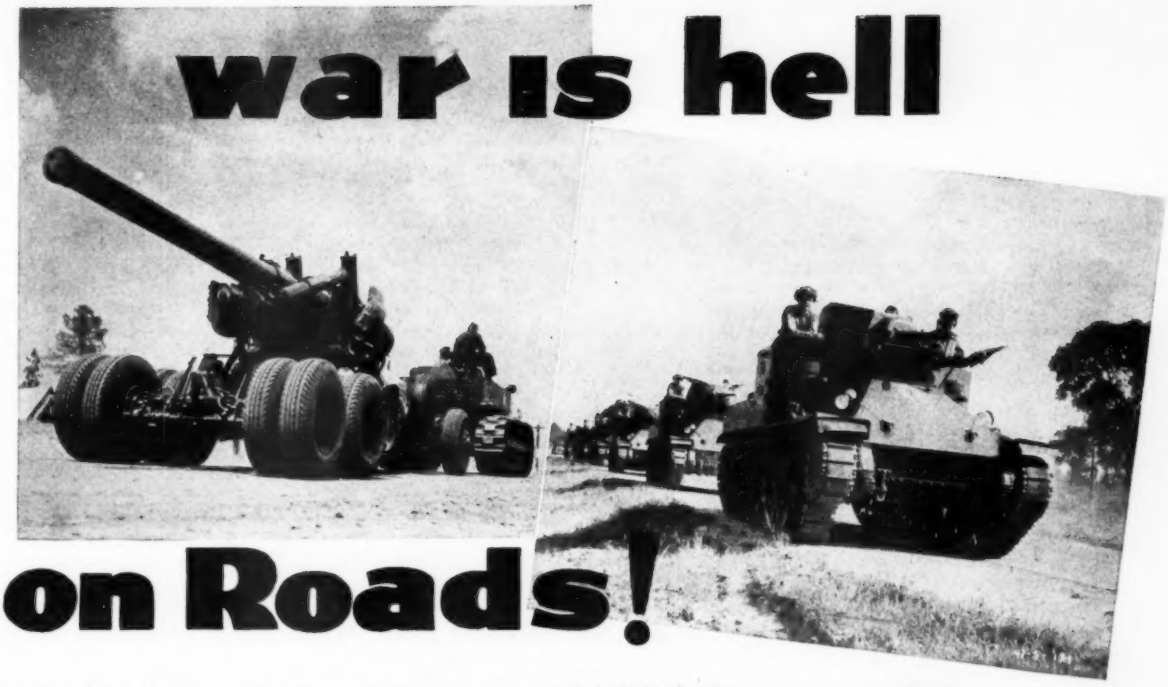
New Jersey State Highway Commissioner E. Donald Sterner, who is defense road coordinator of the North Atlantic States, told the convention that a proposed super highway between Boston and Washington has been indorsed as the No. 1 inter-regional project in the country by the Inter-Regional Highway Committee.

Although the project has been listed as a post-war job, Sterner said its construction during the war was "highly probable" because of the widening scope of the armed forces throughout the area.

Addressing a special session on defense roads, Sterner discussed an immediate highway program which will deal principally in intensive maintenance and improvement to the existing strategic military network, construction of access highways to war industries and federal camps and arsenals, and of flight strips and emergency landing fields for airplanes adjacent to state highways.

He said construction of access highways to war industries depends on the submission of statements by the industries, setting forth objectionable conditions with relation to the ability of defense workers to reach their places of

war is hell



on Roads!

Roads don't have to be in combat zones to get "shell holes"—abusive wear of extra heavy trailer-truck traffic and the movement of army vehicles have to be reckoned with.

Too, road men have a greater obligation today than ever before, *because the rubber shortage demands the conservation of every tire,* and that means careful maintenance both of arterial highways and feeders.

The tremendous cost of war preparation necessitates economies in normal public works—that's where Universal Crushing Equipment comes in: the greater output it provides minimizes the amount of equipment needed for producing road materials; the weight-saving Rotavator (rotary elevator) Streamlined Crushers developed by Universal engineers reduces wear and tear on roads when portable plants are in transit; and the sound construction, as exemplified by the 6 massive roller bearings on the big quarry crushers, effect savings that road building contractors and commissioners alike cannot afford to overlook. .

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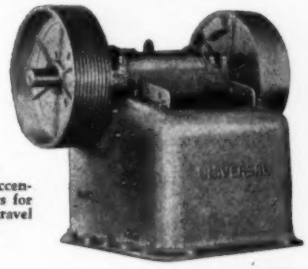

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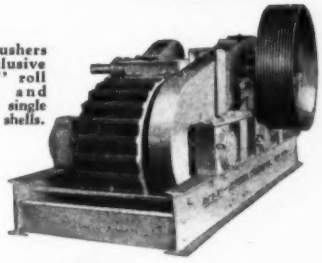

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employment, as well as traffic congestion in the flow of equipment from the plants. He pointed out that New Jersey had started a program of contacting airplane factories and other war industries and urged other states to do likewise.

Commissioner Sterner was unanimously elected president of the association, succeeding Thomas C. Frame of Pennsylvania.

Other speakers included Pennsylvania State Secretary of Highways I. Lamont Hughes, who asserted it was unwise to postpone road projects until after the war, and declared that Pennsylvania would continue to build new roads and improve old ones.

Trinity River Project

The United States Bureau of Reclamation has announced an investigation of the Trinity River Project in northern California, involving possible diversion of part of the flow of the Trinity River to the Sacramento Valley for irrigation, electric power generation, and other uses.

The Trinity Project has been proposed as an emergency means of developing a large block of power for war production, in the event additional sources of hydro-electric energy are needed to supplement the power output to come from Shasta Dam and Keswick Dam of the Central Valley Project. It also is contemplated that the additional water supply available in the Trinity River eventually will be needed in the Central Valley.

District Engineer R. S. Calland said the Bureau of Reclamation study first will be concerned with determining the present and future water demands in the drainage basin of the Trinity River itself, as well as the lower Klamath River into which the Trinity empties.

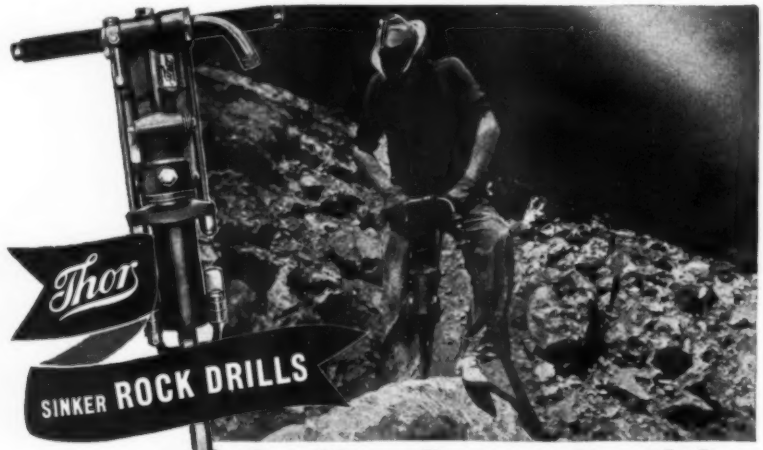
Engineer C. W. Burningham, transferred to California from Coulee Dam, Washington, has arrived in Redding to conduct the Trinity investigation. Mr. Burningham has been with the Bureau of Reclamation for 20 years, including service in Utah and South Dakota, after which he was at Boulder Dam for four years and at Grand Coulee Dam for seven years.

As originally conceived as a unit of California's long-range state water plan, the Trinity Project would include a large storage reservoir on the upper river near Weaverville, a diversion dam a short distance downstream to turn water into a six-mile tunnel through the Trinity Mountains, and about 20 miles of canal, pipe line, and other conduit discharging into the Sacramento River near Keswick. Power plants would be located at the base of the Trinity River storage dam and at probably three power drops of several hundred feet along the conduit system.

Road Builders Pledge All-Out Aid for Victory

All-out co-operation with America's victory effort was pledged by the American Road Builders' Association at its Defense Highway Congress in Memphis, Tennessee, March 2-5. Another resolution reaffirmed the association's stand in support of the contract system as the best method for road construction. Alabama Highway Director Chris J. Sherlock was formally installed as ARBA president at the March 3 victory banquet at the Peabody hotel. Retiring President Hal G. Sours, Ohio director of highways, addressed the banquet, stressing the need for a post-war road program. The association presented Mr. Sours with a U. S. defense bond in recognition of his services during his two years as president. Guest speaker was John L. Rogers, director, division of motor transport, Office of Defense Transportation, who discussed the role of highway transportation in the national emergency. Tennessee Congressman Clifford Davis served as toastmaster and introduced distinguished banquet guests.

Road building's main job today is construction of access roads to military camps and establishments and to war-industry sites and reconstruction of inadequate roads on the strategic network, Mr. Sours told the opening session. Indispensability of motor transportation to defense was stressed in the address of G. Donald Kennedy, Michigan state highway commissioner



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Thor Sinker Rock Drills in every weight class have an *extra* margin of power that means the difference between ordinary and *outstanding* footage on down-hole rock drilling. They hit hard and fast because they actually use most effectively ALL of the air that enters the machines. Basic reason for this is the patented Thor short-travel, tubular valve (with a controlled tolerance of .00025") that measures and admits exactly the right amount of air for peak operating efficiency.

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Thor *Portable Pneumatic and Electric Tools*
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Easy Holding — Sturdy Construction

Just as Thor's principle of "Measured Air" assures full efficiency and control, so also does it provide easy handling. With every stroke powered by the same amount of air, operation is smooth and uniform. Naturally, minimum vibration contributes to longer life. Today, on scores of road building, shaft-sinking, tunnelling and other projects Thor Rock Drills are delivering more footage per shift. Ask for details.

A Thor Sinker Rock Drill For Every Drilling Job

7 standard models for light, medium or heavy duty work in the most popular weight classes. Other types available for special applications.

MODEL NO.	TYPE OF SERVICE	WEIGHT CLASS
38	Light Duty	45 lb.
79	Auger Drill	45 lb.
70 Series	Medium Duty	55 lb.
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Your wire rope will last longer with *Proper Lubrication*

WIRE rope, like a lot of other things, is going to be harder and harder to get. If your equipment is to keep on working, you must take every care to make your wire rope last as long as possible. It's good sense at anytime. Right now, it's a patriotic duty.

Every American Tiger Brand Wire Rope comes to you from the factory properly lubricated and ready for service, but factory lubrication, no matter how efficient, will not last the life of a rope. Field lubrication is absolutely essential.

Because it is such an effective deterrent to corrosion, proper lubrication at regular intervals is perhaps the most important aid to longer rope life and increased operating efficiency. So don't neglect it. Proper lubrication protects both inside and outside wires against destructive rusting. It keeps all wires free to slide on each other, as they must do when the rope bends over sheaves and drums. It minimizes friction and wear between individual wires and also between the rope and the sheaves or guide through which it passes. It is the safest, surest method of preventing excessive wear inside the rope where it is most dangerous because you can't see it.

Remember — every wire rope allowed to wear out prematurely through neglect or improper use is an unnecessary loss to the nation.

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THIS FREE BOOK TELLS HOW . . . SEND FOR IT

Every phase of wire rope care and handling is detailed in this 48-page, illustrated booklet. Follow the boiled-down experiences of thousands of rope users and you will be surprised how much better your wire rope will perform and how much longer it will last.

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and American Association of State Highway Officials president. House Roads Committee Chairman Wilburn Cartwright of Oklahoma pointed out that road machinery plants must now make war machines, machinery must be used to build military bases and the men who have been building highways must build bases. Outstanding lesson of the 1941 maneuvers was the need for 12-foot shoulders and additional bridges, according to Colonel John W. Wheeler, U. S. Army.

Business as usual is a thing of the past, according to Mason Manghum, head, industrial contact and education unit, War Production Board, who addressed the WPB Priorities Luncheon, March 3. Critical material shortages were discussed by Dr. Harvey A. Anderson, chief, WPB Conservation and Substitution Branch. Inside information on priorities procedures was given at various clinics which followed the luncheon.

Colonel Thomas F. Farrell, executive officer, operations branch, construction division, Corps of Engineers, told delegates that over 8,000 miles of roads or their equivalent have been constructed in the army building program. Of this total about 5,000 miles are airbase and airfield construction, 1,300 are in camps and cantonments and 1,700 in ordnance plants and other military installations. National need for self-liquidating and publicly owned superhighways was stressed by West Virginia Congressman Jennings Randolph. Carlos Bazan, Mexican director general of highways, reported that the Mexican government will spend approximately $33,000,000 for highway construction this year. Organization and objectives of the Mexican Road Builders' Association were explained by Jose Rivera R, secretary, Mexican Automobile Association.

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KEEP THEM WORKING
Most operators and engineers will tell you that for effective results on Brakes and Clutches GATKE Moulded Asbestos Brake Materials can't be beat.
They give smooth, positive, non-grabbing action for easy handling dependability, long wear life with fewer adjustments, and lowest maintenance expense under all conditions.
GATKE Brake Materials have been developed and service-proved for every requirement of Excavating, Road Building, and Construction Equipment.
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New Jersey Highway Commissioner Resigns

Resignation of E. Donald Sterner as New Jersey state highway commissioner, effective April 29, was submitted March 2 to Governor Charles Edison, who immediately accepted it. No successor had been named at this writing.

The resignation broke a long deadlock between Governor Edison, a Democrat, and the Republican state legislative majority over control of the road department. Sterner's six-year term expired April 29 last year but he was continued in office when the Republicans refused to confirm Edison's nomination of William L. Dill. Sterner, a Republican, was appointed by former Governor Harold G. Hoffman.

In yielding his $15,000-a-year post, Sterner referred to his previously expressed desire to get back to his lumber business at Belmar, New Jersey. Death of his father, Willard Sterner, last September has made it increasingly necessary, he said, to return to private life. He also stated that his work on the federal defense roads program would be "fairly well launched" by April 29.

Arizona State Highway Job

Seven miles east of Wickenburg, Arizona, men and machines are rushing ahead to finish one of the last civil highway links sponsored by the Arizona State Highway Department before the United States' declaration of war against the Axis powers. The $157,500 project, which will complete another portion of U. S. Highway No. 70 west of Phoenix, involves a variety of excavation, fill and the construction of several concrete structures.

For several years increased automobile traffic sped over the two-mile stretch at great peril. A narrow, dangerous overpass crossing the Santa Fe Railroad tracks had short radius curves at each end of its approach. This entire approach fill is to be removed and rebuilt in a straighter line. The width of the concrete overpass deck will be increased from 18 to 30 feet. Time is short, so construction work is going ahead rapidly under the personal direction of Superintendent Richard E. Martin and Assistant Superintendent B. N. Martin of the Martin Construction Company of Tucson, holders of the state contract.

At the start of operations, the Martin boys immediately ran into the prob-

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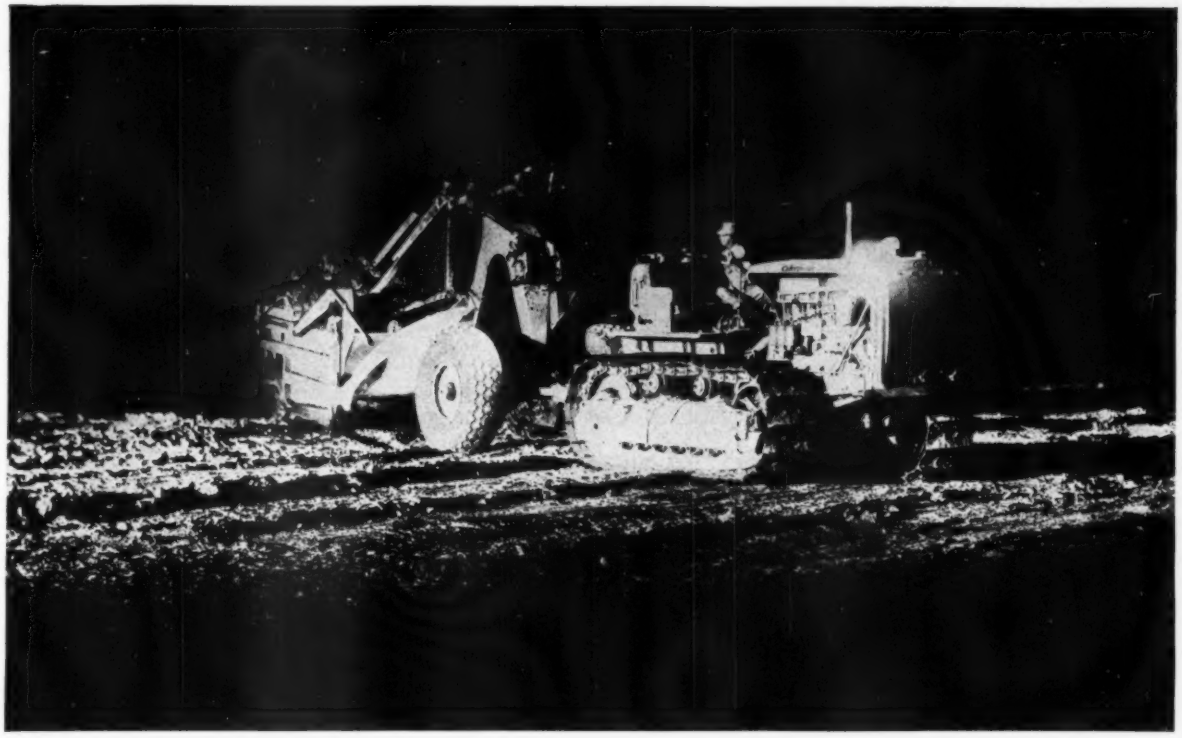

THE "CAT" THAT PURRED 9000 HOURS

NINE THOUSAND hours between overhauls! That would be impressive if it were said about *one* piece of Diesel equipment operating under favorable conditions. Read what Hunkin-Conkey Construction Company says about their experience with RPM Delo in building the U. S. Ordnance plant, [redacted] Ohio, one of the biggest construction jobs of its kind in the world:

"We have moved in excess of three million cubic yards of dirt, using the following Diesel-powered equipment: 86 tractors, 23 cranes, 11 shovels, 7 locomotives, and 6 power graders. RPM Delo has been used exclusively in every Diesel engine on this job and we have not lost a single bearing in any Diesel.

"Over 30 pieces of Diesel equipment have now passed 9,000 hours of operation, each without an overhaul, and one piece has operated over 10,000 hours and oil consumption is still not excessive.

"Needless to say, we are proud of our maintenance record and are especially pleased with the performance we have had from RPM Delo in our Diesels under severe operating conditions."

At a time when hours are precious, when equipment is almost impossible to replace, Diesel users are swinging more and more to RPM Delo—the oil used by U. S. Navy submarines and approved by the makers of 95% of America's installed Diesel power.

ORDER RPM DELO FOR YOUR DIESELS

RPM Delo is marketed under the following names:

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Ask your Diesel engine manufacturer or distributor for the RPM Delo supplier in your vicinity.

RPM DELO
REG. TRADE-MARK
DIESEL ENGINE LUBRICATING OIL

STANDARD OIL COMPANY OF CALIFORNIA

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lem of re-routing 3,000 vehicles per day. A special detour was built in record time, completely by-passing the job. Sagebrush and scattered cactus were bladed off the detour site with a Galion 101 motor grader. The desert was level, so no extensive cuts or fills were necessary in the detour itself. Rough excavation and leveling was done by an International TD-18 TracTracTor and a Bucyrus-Erie S-90 scraper. The cable controls of the scraper were handled by a Bucyrus-Erie Model P-24 2-drum power control unit.

All of this excavation was done in typical desert formations. Sand and loose, dry alluvium mixed in with about 12% of silt and clay is a close enough description for all practical purposes. Hauls were kept down to 700 feet or even less. Although the material was loose and dry the scraper came out each time with at least a struck capacity load without the aid of a pusher tractor.

Oil cake was stripped off the old highway and re-processed to carry the detour traffic. This oil cake was loaded off the old road by a small ¾-yard P&H shovel into 5-yard International trucks, which then hauled it to the detour.

Select material for the new highway base course was made up of 139,000 cubic yards of imported borrow, 39,000 cubic yards of select pit run gravel, and 10,000 cubic yards of crushed selected base. All of this yardage was hauled from the borrow pit by the International trucks. A Koehring 401 shovel was used to load the Internationals. It was processed by adding water from a Fruehauf semi-trailer type water tank truck and rolling the fill in 6-inch layers with an International TD-40 drawn sheepsfoot roller.

• An Arizona State Highway Department International tractor and Bucyrus-Erie scraper unit picks up a windrow of dirt bladed by the Galion motor grader in the rear.

Nearly a third of the total excavation was included in the removal of the approach fill at both ends of the overpass and about 50,000 cubic yards of digging was necessary. Superintendent Martin decided even before the project began that this was a scraper job. As a matter of fact, the tractor-scraper combination was purchased especially for this type of work.

Excavation of the overpass approaches went along without any trouble and it was done in a few weeks. Loading downhill made full loads easy to pick up.

The concrete deck was removed and re-poured. A few 12"x12" steel H-bearing piles were needed to carry the increased weight and to brace the structure against the added push of the consolidated fill. These were driven by the

WELDED
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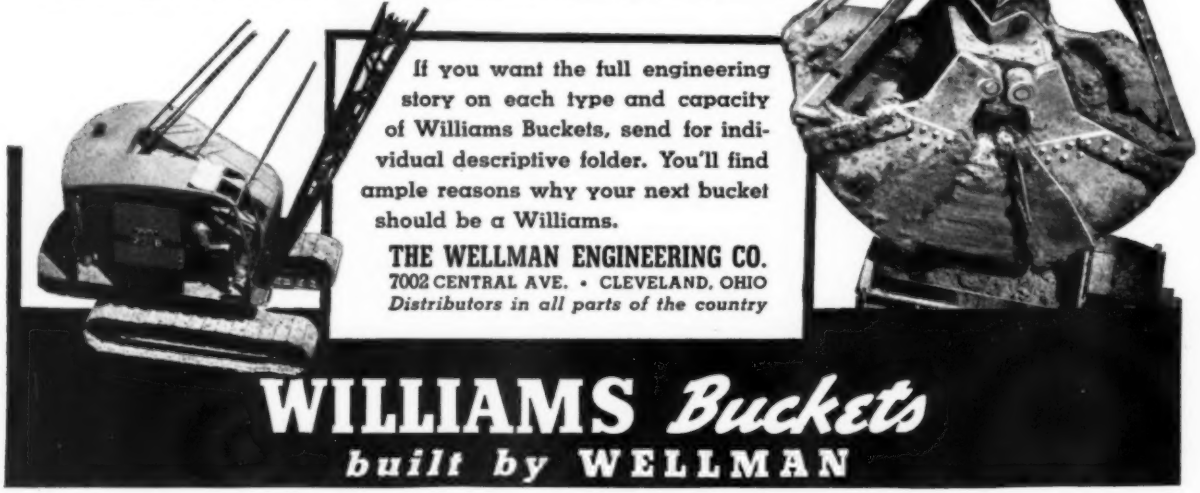
FOR GREATER STRENGTH AND SPEED

An operator really makes time with a Williams Bucket on the end of his boom. A few grabs and another full loaded truck is on its way. Williams Buckets have tremendous closing power—they dig deep—bite clean and come up with heaping loads. Williams Buckets are "built to last and move dirt fast". And that's exactly what a contractor wants—long service at little maintenance cost, and fast, dependable action when moving yardage spells profits.



If you want the full engineering story on each type and capacity of Williams Buckets, send for individual descriptive folder. You'll find ample reasons why your next bucket should be a Williams.

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WILLIAMS *Buckets*
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FRANK, WARTIME MESSAGE TO CONTRACTORS AND ENGINEERS

Why It's Difficult to Get LeTourneau Equipment Now

Defend America—that was the 1941 national program. To keep pace, LeTourneau doubled production, delivered 85% to high-rated projects. Practically all of this and some more—95% of our output—was sold through regular LeTourneau-"Caterpillar" dealers for delivery to private contractors working on cantonments, ammunition dumps, airports, etc. That was 1941.

Fleet of C Tournapulls working on an offshore airbase.

Deliveries to Speed Offensive

Today, we are at War, striving desperately to take the Offensive. Our Government has asked us to increase production. LeTourneau expects to build 50% more equipment in 1942 than ever before. Most of it will go directly into active combat service with the U. S. armed forces. The remainder will work night and day to construct offshore bases, airports, plane assembly plants, war factories and training camps urgently needed for Offense and Victory.

A few of you who are working on these vital Victory projects, will be able to get new equipment. To many, though, the Victory program means using for the duration the equipment you now have.

If, like hundreds of other successful contractors and engineers, you already have LeTourneau Carryalls, Dozers, Rooters and Tournapulls, you're fortunate. That equipment was built stoutly for long life. Thanks to LeTourneau welded alloy steel construction, it's easy to repair; can be economically reconditioned to practically new working efficiency.

Expert Service Available

Your LeTourneau-"Caterpillar" dealer carries a large stock of factory-made parts to serve you with a minimum of delay. He has expert, factory-trained servicemen ready to help you with your equipment maintenance and overhaul problems. Many LeTourneau dealers are equipped with portable welding outfits, to give you time and money-saving service right on the job. All have excellent shop facilities.

So to keep your equipment operating steadily, see your LeTourneau-"Caterpillar" dealer.

BREAKING IN NEW OPERATORS?

Give them *The Co-Operator*—written by and for tractor operators, in the interests of making tractor power go farther through the proper care and use of LeTourneau earthmoving equipment. It's read regularly by over 20,000 operators, engineers, superintendents, foremen and mechanics who want to learn more about:

Equipment repair and maintenance . Cable care, selection and operation . Care of tires . Lubrication . Job layouts, methods of cut, fill, compaction, etc.

The Co-Operator is offered to you and your men absolutely free—10 fact-packed issues yearly. You can get as many copies as you need by writing *The Co-Operator*, R. G. LeTourneau, Inc., Peoria, Illinois. Send . . . NOW!

MOVES FASTER, SAVES $1,000 IN FREIGHT with TOURNAPULLS

No flat cars were available when Contractor Robert J. Dill had to move 4 Tournapulls (below) from Alabama to Florida—460 miles away. Big rubber tires on his Tournapulls, plus fast 14 m.p.h. speeds, enabled him to drive the Tournapulls over the highways in 4 days of daytime travel. Results: Mr. Dill writes, "For the total trip, covering salaries of four operators, their expenses, fuel, oil and grease . . . compared with shipping the Tournapulls by freight, plus cost of loading, blocking and unloading . . . we saved approximately $1,000."

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CARRYALL SCRAPERS, ANGLEDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, TRACTOR CRANES, PUSHDOZERS, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNATRAILERS*, TOURNACRANES*.
*Name Reg. U. S. Pat. Off.

For your convenience in writing to R. G. LeTourneau, Inc., you will find a card bound in this issue.

• A tractor-towed spreader followed by a roller applies a topping coat to a California soil-cement road.

Koehring 401 machine, using a portable set of leads and a 2,000-pound drop hammer.

At the time the job was visited Superintendent Martin expected to install a crusher and a small hot plant for turning out the 10,000 tons of black bituminous surfacing.

California Soil-Cement Road

By John R. Marcy

Attracting much attention among California road builders is the state highway's new soil-cement cut-off constructed between Coast Highway 101 near Corona Del Mar to a point about three miles south of Santa Ana on Newport Boulevard, a distance of 6.3 miles.

While soil-cement construction is still somewhat of a novelty in itself in this part of the country, the unusual specifications called for and the methods of mixing and handling gave this job added interest.

A roadbed 84 feet wide on the south four miles of the cut-off, and 72 feet wide on the north end, was graded for the entire distance, but only the south portion has been paved the whole width. Here two 23-foot lanes separated by a 20-foot dividing strip were constructed of soil-cement eight inches thick surfaced with three inches of blacktop. On the north portion a single 23-foot lane of similar construction was put down. Later a second lane will be added here under separate contract.

To form the subgrade, 1½ feet of select material was brought in by means of shovels and trucks and compacted to 95% or better with sheepsfoot rollers. The fills, of which a great many were required, were compacted in 8-inch layers to 90%, and select material three feet thick was added for the subgrade. Some 230,000 yards of excavation was involved in the contract, and about 18,000,000 yards of overhaul.

The 8-inch soil-cement base was handled differently from the usual mixed-in-place or windrow methods. All material came from a borrow pit. It was loaded by shovels into trucks and taken to a batcher located near the center of the job, then dumped in a hopper and conveyed to the batcher and mixed with concrete. The batcher was a Standard Steel pug mill type with a capacity of 4,000 pounds. Cement was delivered in bulk from the Riverside Portland Cement Company, and handled similarly to the soil. The proportion of the mix used was 7% cement by weight.

Trucks delivered the mixed material to a spreader which levelled it to uniform thickness. Immediately behind the spreader a 12-ton Buffalo-Springfield steel roller passed back and forth, making as many trips as possible on a 30 or 40-foot length until another course of similar length had been spread ahead.

After the roller moved on, the surface was bladed to remove irregularities, and a pneumatic tired roller passed over it. Then the top was sprayed with a seal coat and the whole allowed to cure for seven days, during which construction traffic was not permitted on it.

Production time of the stabilized base was approximately 1,000 feet per day.

The 3-inch blacktop was laid in two courses, the base being spread with motor patrols and rolled with tandem rollers, and the surface course spread with a Barber-Greene spreader and rolled.

Work was started on February 5, 1941, and the road was officially opened to traffic January 15, 1942. An average of 75 men were employed on the job. The work was done by Mittry Brothers Construction Company of Los Angeles at a contract price of $200,000. D. L. Ross was construction superintendent for the contractors, and W. D. Eaton resident engineer for the state.

Propose Cross-State Highway for New York

Construction of a New York cross-state express highway from New York City to Buffalo, and thence southwest to the Pennsylvania state line, would be authorized under terms of legislation introduced March 13 in the New York Legislature by Assemblyman Abbot Low Moffat of Manhattan, chairman of the House Ways and Means Committee, and Senator William H. Hampton of Utica, both Republicans.

Planned as a post-war project, no immediate appropriation was contemplated. The early introduction of the measure was intended to allow planning in advance, so that the new highway may be properly laid out; so that the

For your convenience in writing to The Owen Bucket Co., you will find a card bound in this issue.

AMERICA'S OWN KIND OF WAR

★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Our country didn't ask for this war. It was thrust upon us by a treacherous enemy. But of all the wars in world history, this one comes nearest to being made to our measure.

The whole life and training of generations of Americans fit us to excel in mechanized warfare. From pioneer days we have been an ingenious people. Starting in a vast, undeveloped country, we have had the inventive skill and the resolution to shorten distances and lighten toil with machines.

We have built more railroads, more motor cars, trucks and tractors than any other nation on earth. We have built machines to turn the resources of mines, forests, oil fields and farms into productive wealth. And among the millions of Americans now of military age, there is scarcely a man who has not grown up familiar with the handling of machinery.

We have the horsepower and the man-power. We know how to use machines and we know how to produce them. There is only one thing that can lose this war for us, and that is complacency —half-hearted effort—failure to face the shocking possibility of defeat.

To win we have got to put *all* our energy and *all* our will into the one big job before us.

There is no complacency among "Caterpillar" men and management. Every worker in the plant knows why America needs the machines he builds, and he builds them with all he's got.

"Caterpillar" Diesel Tractors, Graders, Engines and Electric Sets are giving valiant service today on every fighting front. They are saving men, and the time and labor of men; breaking jungle trails, building and repairing landing fields, hauling big guns, powering winches, generating current for search-lights and telephones, clearing beach-heads, supplying main or stand-by power for Navy and Coast Guard craft.

Without redesigning or lost motion, the whole productive effort of this company has now been given a single aim — to put Diesel power in the hands of our Armed Forces and our Allies. And "Caterpillar" dealers everywhere are devoting their service facilities to keeping the machines in fighting trim for the all-out war job.

In this battle for our rights and freedoms, there is no room for bystanders. All of us are fighters now. And it's *our kind of fighting!*

CATERPILLAR TRACTOR CO.

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TO WIN THE WAR: WORK—FIGHT—BUY DEFENSE BONDS!

MARVELOUS NEW EQUIPMENT moved into the DEFENSE BATTLE on the decks of ROGERS HEAVY DUTY TRAILERS

ROGERS BROS. CORP.
136 ORCHARD ST.,
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EXPERIENCE builds 'em
PERFORMANCE sells 'em

state may acquire title to a right of way, and so that such highways as may be built in the interim will be planned for coordination with the proposed express trunk line.

The proposed highway would be called a "thruway," serving principally Albany, Utica, Syracuse and Rochester as the main business and population centers between New York and Buffalo, along which route reside more than 80 per cent of the population of the state.

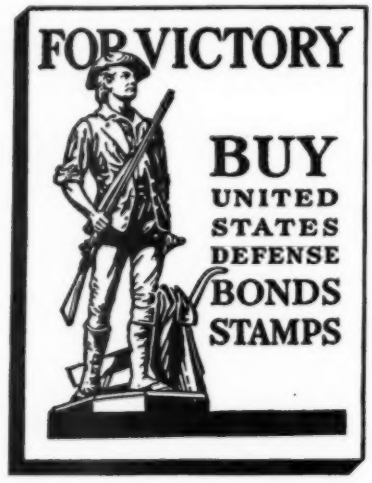
The bill's sponsors regard state acquisition of a new right of way as more economical than to attempt to widen and change existing highways. The plan has the approval of the State Department of Public Works.

New Hampshire Road Men Meet

George Thibodeau, president and owner of the Thibodeau Road Construction Company, of Wolfeboro, New Hampshire, has been elected president of the New Hampshire Good Roads Association, succeeding Austin E. Page, Concord engineer.

Other officers, named at the association's annual meeting March 12 in Concord, include: First vice president, LeRoy F. Johnson of Concord; second vice president, Theodore E. Boardman of Amherst, and secretary-treasurer, Paul S. Otis of Concord. Page and Edwin B. Hodgins of Pittsfield were named directors.

A resolution was adopted expressing strong opposition to all proposals to increase federal levies on gasoline and lubricating oils. The resolution asserted that any further rise in such federal taxes would "hamper the production of materials and the mobilization of our resources, and will vitally affect the financial stability of the State of New Hampshire by subjecting it to undue competition in a shrinking field of taxation."



February Construction Volume

Acceleration of the war construction program resulted in an increased volume of building and engineering contracts in the month of February, according to F. W. Dodge Corporation. Total contracts awarded during February in 37 eastern states amounted to $433,557,000, compared with $316,846,000 in January and $270,373,000 in February 1941. The accumulated dollar volume of contracts let during the first two months of this year is 30 per cent greater than the figure for the corresponding period of 1941. In spite of this substantial increase, the augmented program has scarcely gotten into full stride. Contract totals for these 37 states averaged over $500,000,000 a month during 1941, and this year's program is expected to top that of last year.

February's contracts, in comparison with those of February 1941, showed the following dollar volume increases: heavy engineering construction, up 6 per cent; non-residential building, up 38 per cent; residential building, up 62 per cent.

HAYWARD BUCKETS
WON'T QUIT OR CAUSE TIME OUT
A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.
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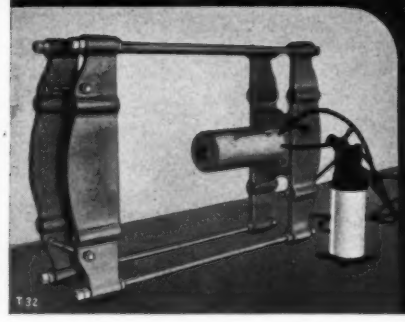

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SOUTH MILWAUKEE WISCONSIN

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A "CORRECT" ANSWER TO THE PROBLEM OF OXIDATION IN DIESEL CRANKCASES:

Problem: The crankcase of a modern Diesel engine is a "torture chamber" for lubricating oil. As the oil escapes from the ends of the bearings, it is whipped into a fine mist by the racing crankshaft and rods. In this finely divided form, the oil is attacked from all sides by *hot air*. The constant churning and presence of impurities accelerate the tendency for oil to oxidize and form deposits.

Answer: To resist this terrific punishment, oil must have the greatest possible stability. It must be made from carefully selected crudes; refined with greatest skill. Backed by 76 years' experience, Socony-Vacuum has created "correct" oils for *every* type and size of Diesel engine.

Gargoyle D.T.E. Oils 1-to-5 are designed for maximum protection and stability in large and intermediate Diesels. *Delvac "500 Series" Oils* are specially made for small, high-speed engines.

TO HELP MAINTAIN CAPACITY PRODUCTION, CALL IN

SOCONY-VACUUM for "Correct Lubrication"

SOCONY-VACUUM OIL CO., INC. — Standard Oil of N. Y. Div. — White Star Div. Lubrite Div. — Chicago Div. — White Eagle Div. — Wadhams Div. — Southeastern Div. (Baltimore) — Magnolia Petroleum Company — General Petroleum Corporation of Calif.

GARGOYLE

Lubricants

For your convenience in writing to Socony-Vacuum Oil Co., Inc., you will find a card bound in this issue.

NOT in the *Contract*

The recruit, keeping guard, heard, through the darkness, the sound of an approaching horse.

"Halt! Who goes there?" he challenged.

"The commanding officer," came the reply.

"Dismount, sir, and advance to be recognized," called the guard.

The officer did so, then he asked, "By the way, who posted you here?"

"No one, sir," said the recruit, "I'm just practicing."

"Goodness, George! This is not our baby! This is the wrong carriage."

"Shut up! This is a better carriage."

A celebrated lawyer once said that the three most troublesome clients he ever had were a young lady who wanted to be married, a married woman who wanted a divorce, and an old maid who didn't know what she wanted.

"They tell me Jones has a right good voice. Is he cultivating it?"

"I can't say about the cultivating but I know he irrigates it frequently."

A motorist had just crashed into a telegraph pole. Wire, pole and everything came down around his ears. They found him unconscious in the wreckage, but as they untangled him he reached out feebly and fingered the wires and murmured:

"Thank heaven I lived clean; they've given me a harp."

Sign on a truck: "This truck stops for all R. R. crossings, redheads and brunettes—and will back up one-half mile for a blonde."

"Are you the man who saved my little boy from drowning?"

"Yes."

"Well, where the hell's his cap?"

"He's been treating the men just like dirt!"

Alas!

This salesman was eloquent about the merits of a vacuum cleaner, but the village housewife wasn't impressed. She suggested that he talk less and show her what the machine could do.

He took off his coat, fitted up the cleaner, thrust his arm into the chimney, of the open fireplace and brought out a handful of soot, which he scattered over the carpet.

He then shovelled some ashes from the grate and sprinkled them over the rug, adding a big handful of soil from the garden. Then he smiled and rubbed his hands.

"Now," he said, "I'll show you what this vacuum cleaner can do. You'll be surprised, madam. Where's is the electric switch?"

"Switch?" echoed the surprised woman. "We use gas."

Sonny: "Say, Dad, what does argument pro and con mean?"

Dad: "Well, my boy, pro is your convincing and unanswerable statement, while the con is the contemptible dribble of the other fellow."

A widow is the most fortunate woman in the world. She knows all about men, and all the men who know anything about her are dead.

Nurse: "I think that shovelrunner in room 312 is regaining consciousness, doctor. He just tried to blow the foam off his medicine."

An old lady kept a parrot which was always swearing. She put up with this but on Sunday she kept a cover over the cage—removing it on Monday morning. One Monday afternoon she saw her minister coming toward the house, so she again placed the cover over the cage. As the reverend gentleman was about to step into the parlor, the parrot remarked: "This has been a damn short week."

Continuous Mixing

Why did Barber-Greene build a continuous mixer instead of the conventional intermittent batch type? The answer is in the diagram of the Barber-Greene shown above. At the upper left, the graded, and accurately measured aggregate continuously enters the pugmill in a small stream. In entering, it falls through the spray chamber where it is continuously sprayed with a small stream of metered bitumen. The combining process has started, even before the materials enter the pugmill. The need for preliminary dry mixing is completely eliminated. The Barber-Greene does not have to undo the segregation caused by dumping batches into the mill. In fact a cross section of the mix extracted just a few inches beyond the charging end of the pugmill contains the correct amount of each size of aggregate with the correct ratio of bitumen.

Here the propelling and retarding paddles work the material through the pugmill under pressure, using friction to take the excess from the fines and evenly coat the coarse material.

As the mix is constantly worked through (from left to right in diagram) there can be no dead material, even at the very bottom.

The Barber-Greene uses more horse-sense, and less horse-power. It attains complete homogeneity the easiest, most logical way. It has not only established new standards for accuracy and uniformity, — but has changed moving and erection from a major project to a simple low-cost maneuver. Barber-Greene Company, Aurora, Illinois. 42-1

BARBER GREENE

For your convenience in writing to Barber-Greene Company, you will find a card bound in this issue.

RUSH ORDERS

80 yards per hour on an average 600 foot haul is the line record established by each of these two 8-yard scrapers on a southeastern air field.

Rush orders for airports are coming your way and it will pay you to investigate now the outstanding performance Bucyrus-Erie tractor equipment has proved on airport construction in all parts of the country. A few of these operations are illustrated here, and there are many others where fleets of Bucyrus-Erie have demonstrated their ability to out-perform anything in their class. Measured on the basis of output capacity, economy, convenience, accuracy of grading, or trouble-free operation, you will find only one answer by the men who have used them and that is "Bucyrus-Erie first . . . by a wide margin."

Bucyrus-Erie scrapers load easily with a fast flowing boiling action. They handle any type of material with uniform big pay loads. The positive rolling ejection cleans the bowl fast. The dump can be bunched or spread accurately with the smooth operating two-line control.

Bucyrus-Erie bullgraders and bulldozers dig fast and carry heavy loads easily because of the engineered curve of the blades that gives free non-fouling rolling action. You get extra horsepower for digging because of the balance that keeps the crawler tracks driving with "all four feet" on the ground. The efficient dependable control system provides accurate grading and dependable low maintenance operation.

In addition to a complete line of 4-wheel and 2-wheel scrapers, bulldozers, and bull-graders, Bucyrus-Erie also offers rippers, tamping rollers, and grubbers to speed up airport work. Bucyrus-Erie Company, South Milwaukee, Wisconsin, U. S. A.

• SEE YOU
TRACTRACTO

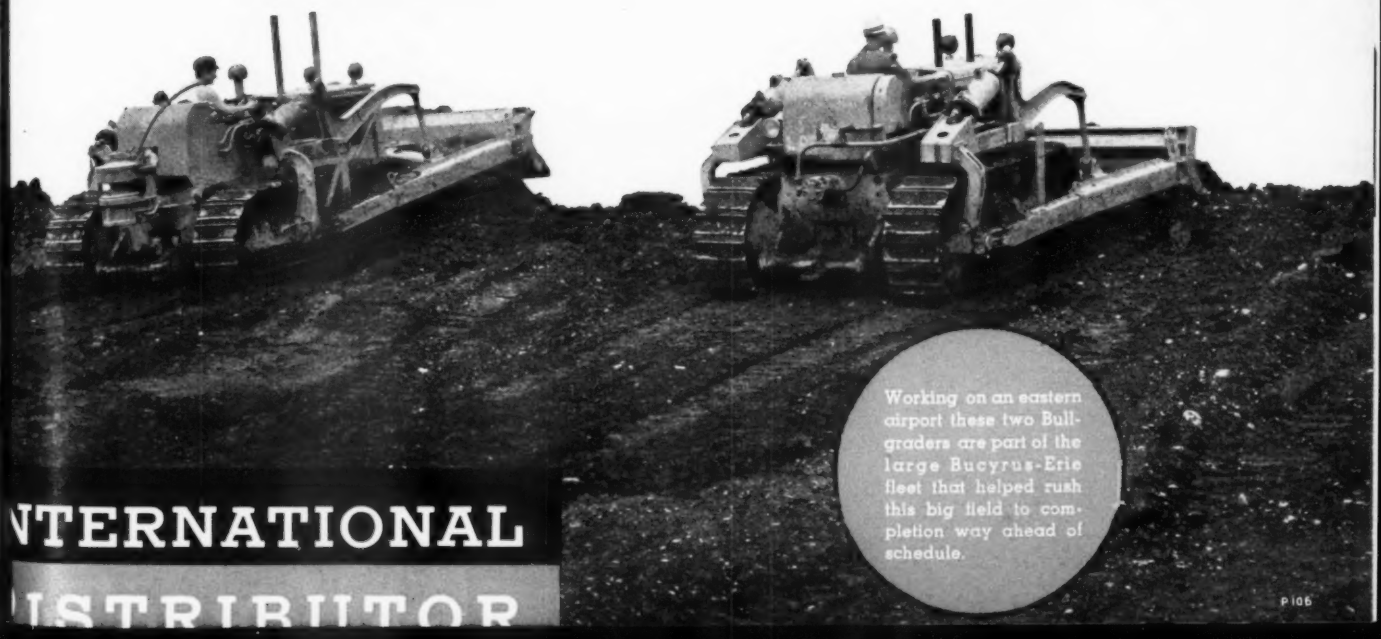
FOR AIRPORTS

Two of five 8-yard Bucyrus-Erie 4-wheel scrapers are shown at work on a large southern airport. On this particular operation the two units team up for runway construction.

Averaging 64 yards of white loam per hour this 8-yard scraper was one of the big reasons this mid-western airport was finished in such fast time.

This TD-9 Bullgrader, on the job at a western airport, is a mighty handy unit for backfilling drainage trenches and fine-grading runways.

BUCYRUS ERIE

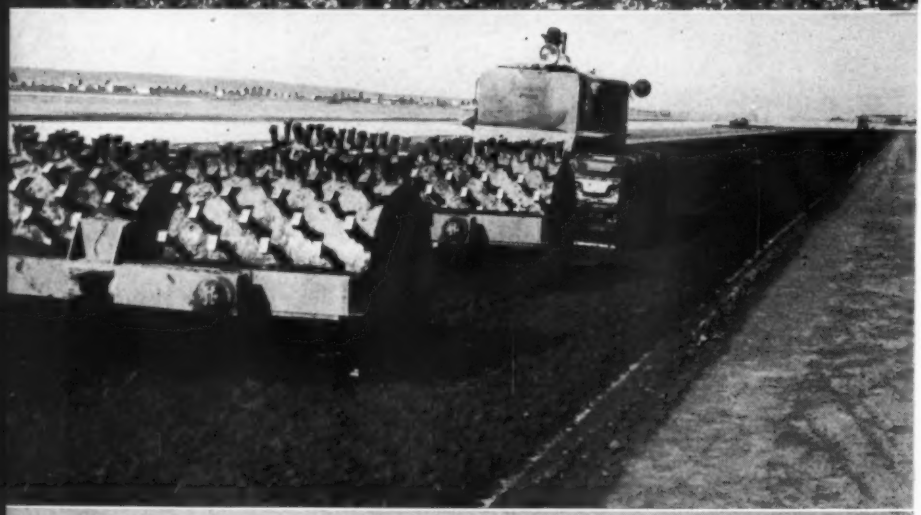


Working on an eastern airport these two Bullgraders are part of the large Bucyrus-Erie fleet that helped rush this big field to completion way ahead of schedule.

P106

INTERNATIONAL

DISTRIBUTOR



March Field

(Continued from page 189)

pump furnished the operating power.

By bringing the mix up to optimum each particle was water lubricated so that the "little pieces could slide in between the big ones" and cause a heavy, dense fill. At that stage March Field soil was dark and friable, easily worked, with no free water present. From a practical view, the view of tractor operators and men who generally work on earth fills or embankments, the soil was wet and mixed until it would just scarcely begin to stick to the back end of a sheepsfoot roller.

But there was a better, more scientific check than this. Here again, laboratory men checked the water content rapidly. Very often a sample was tamped into a special cylinder made for the purpose and checked against density samples taken after the fill was rolled. There is little need to delve into the complexities of density sampling. Briefly, about 10 pounds of earth is removed from the completed fill with a post hole auger, the volume of the hole is calibrated with sand, and the weight (or density) per unit volume is calculated.

Repeated t r i p s were made through the course with all of the various agricultural instruments until the water and cement and soil were thoroughly mixed together. Trip after trip was made in as fast a gear selection as possible, and here again Superintendent Root exhibited sound construction judgment.

Tractors selected had available a sufficient number of gear speeds so that the load could be drawn in a high gear without stalling the tractor. Where it was necessary

• Top to Bottom: One of the first steps in the March Field soil stabilization operations was the thorough mixing of cement into the soil. Here a tractor-towed cultivator, spike-toothed harrow, and sheepsfoot roller successively mix and knead the soil-cement mixture. Water was added when needed for uniform moisture content.

"Ship Us Another Model 410 Buckeye Trencher"

John P. Powers, San Jose, Calif.

410's are moving up "America's Date with Destiny" on scores of defense projects. Making trench 15" to 24" wide and up to 6' deep (7'6" optional). Only 7'10" wide; 6'8" high. High digging and road speeds. Easy to transport and as easy to operate as driving a truck!

We are naturally enthusiastic about Buckeye Trenchers—all 18 of them in the broad Buckeye line—but permit us to quote from a *bonafide* unsolicited letter which speaks more eloquently than anything we could say—

"We purchased what we believe to be the first Buckeye Model 410 Ladder Type Trencher on the Pacific Coast.

"On a United States Army airport job in California, digging trench 24" wide and 5' deep, we averaged 6 lineal feet per minute. The formation was actually hard, being in substance of California "hard-pan" impregnated with niggerheads.

"In our years of trenching operations, we have never had a piece of equipment that has made such a favorable impression. Its sturdiness, flexibility and low operating cost appeal to us. Please ship us another Model 410 Buckeye Trencher as quickly as possible."

(*Signed*) JOHN P. POWERS
Service Trenching Company

Contractors on defense, utility, housing projects and municipal trenching tell us, "you've got something there!" Check its 7 advantages that "pay off" on the grade line, in Bulletin 45.

BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO

Built by Buckeye

CONVERTIBLE SHOVELS, TRENCHERS AND BACKFILLERS, TRACTOR EQUIPMENT, R-B FINEGRADERS, ROAD WIDENERS AND SPREADERS

CHECK PAGE 181

• This Adams diesel patrol grader performed handyman levelling duties throughout the March Field operations.

to go into lower gears the same thing held true, it was never necessary to go into a gear so low that much of the engine's power would be wasted. Using smaller tractors of the Caterpillar D4 and D6 class also saved equipment rental costs as well.

When the strip was thoroughly mixed, a preliminary compaction was made by making eight trips through the course with a Southwest tandem sheepsfoot roller, ballasted to give about 2,100 pounds of pressure per linear foot of tread. After eight trips the soil was kneaded down tightly; so much so in fact that the 7-inch tamper feet were riding well up on top of the ground. An Adams 511 patrol or a Caterpillar No. 12 blade followed this up and gave the course its initial shaping. Excellent grade marks were available simply by blading level between the header screeds set on either side of the course. Two skilled blade men helped to make the surface smooth.

Applying Topping Mixture

After one or two more trips through the course with the roller, a topping mixture consisting of a thin layer of cement was added evenly through a Buckeye spreader box. This was drawn by the same flat rack type truck which hauled the cement. Sacks were broken open and dumped in the spreader box by four laborers.

A trip was then made through this sweetening spread by a 12-foot offset Killefer disc, cutting tiny furrows into the compacted soil to key the cement in to the course. The strip was rolled down immediately by drawing an 11-wheel, two axle pneumatic tire roller over the surface. The rubber tires gave a kneading action which worked out any pockets, and they tended to push coarse particles down into the soil. After a brooming trip was made, using a drag broom on a McCormick-Deering tractor, the course was rolled down with a two axle Buffalo-Springfield 12-ton smooth roller.

Final trimming was done by one of the diesel motor patrols. After a few courses had been laid, the tendency to finish up with excess material was eliminated. Usually only a small windrow was all the material left. This was bladed over the course with other dirt and sprinkled down so that the soil-cement might cure for seven days.

A good average day's run, with the machines listed, showed two 1,250 foot courses completely processed. This amounts to about 1,600 cubic yards of material loosened, processed and cured. Laboratory results were gratifying. Dry weight densities of 119 pounds per cubic foot were not uncommon, and in general the contractor was able to get about

• Left to Right: March Field soil-cement was sampled regularly by government laboratory men. In this test, a sample taken from the job is pounded into a 1/20 cubic foot cylinder to simulate compaction operations. The sample is then tested for shear strength.

SO SIMPLE IT'S UNBELIEVABLE...

Just put a Tamptite cartridge of Hercules dynamite in the bore hole. Then tamp in the usual way.

Presto, the charge is compacted *inside the wrapper*, concentrated to get better breakage.

No slitting of cartridges =
Time saved in preparation.

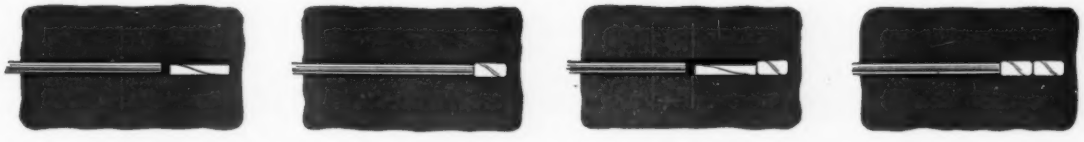
No messy spilling of powder =
Time saved in loading.

No air space around dynamite =
Time saved in handling blasted material because of better breakage.

Any way you add it up, Tamptite saves time. And *time saved* means *increased output* in any language. Ask Hercules for Tamptite cartridges on your next dynamite order.

HERCULES POWDER COMPANY
INCORPORATED
972 KING STREET • WILMINGTON • DELAWARE

A QUICK LOOK AT TAMPTITE IN ACTION!



The regular-size cartridge goes in the bore hole. Note the space to be filled.

Pressure from the tamping rod compresses the powder to fill the space.

Another cartridge goes in—Compaction takes place inside the wrapper.

The charge is concentrated for better blasting results.

A-84

For your convenience in writing to Hercules Powder Company, you will find a card bound in this issue.

• Concrete mixing, spreading, and finishing equipment marches down a runway strip as part of the concrete-surfaced area work is performed.

94% of the best results obtainable in the laboratory so far as compaction was concerned.

It might be well at this point to stress again the importance of keeping the cycle of operations within a definite short time limit. By some strange characteristic, increasing the time element decreases the ultimate possible density to which the soil can be compacted. Resident Engineer Davis demonstrated it simply. He took a sample of soil and marked the sample location. This was taken on soil still well within the time limit. Pounded into a test cylinder, it reached a compaction of 120 pounds per cubic foot. The course was allowed to set three hours. An identical sample was taken from the same location, and pounded in the same way. But the cement had taken its initial set and the soil was stiff and hard to knead. The density in three hours dropped to 106 pounds per cubic foot.

Building Concrete Runway

The 150 foot wide concrete runway was laid on a base course selected from a highway supply in a hill near the field. Decomposed granite was brought in and rolled down by sheepsfoot roller after being spread by a bulldozer or a motor patrol. After the base was pulverized it was levelled off prior to placing the concrete.

Run in strips 12 feet wide, the concrete was held by steel headers set in place by surveying instruments. Dowel steel between strips was placed before the pour was made and expansion joints were also placed. The concrete was dry batched by the Blue Diamond Corporation of Los Angeles and hauled in batch trucks to the job, where it was mixed in a Rex 27E paver.

Following in due course a Jaeger concrete spreader worked the concrete out into a sheet the thickness of the finished runway. A Jaeger-Lakewood temper consolidated it, and a Johnson float finisher left a float finish on the runway. Hunt process sealing solution was sprayed as soon as initial set had taken place. An average of 350 cubic yards of concrete was handled per eight hour shift after a one minute mixing time was approved. Often the daily quota was boosted to 400 cubic yards.

All of the contractor's operations were supervised by Harold H. Root and John Matich. The government was represented by Resident Engineer George Davis, Area Engineer D. W. Morrison and Colonel Edwin C. Kelton, district head of the U. S. Engineer Department.

The contractor employed a night force of mechanics to service and fuel the equipment. A portable rig consisting of a compressor, fuel and grease tanks, hoses and alemite fittings mounted on a truck bed was used. Machines were serviced on the work site while they were idle.

• Superintendent Harold H. Root of the Matich-Yaeger organization was in complete charge of the March-Field soil-cement operations.

The entire job progressed rapidly and smoothly, demonstrating that satisfactory work and rapid progress can go hand in hand if a systematic method is outlined in advance and strictly followed.

Johnny was gazing at his one-day-old brother, who lay squaling and wailing in his cot.

"Has he come from Heaven?" inquired Johnny.

"Yes, dear."

"No wonder they put him out."

Sauerman Cableway Lifts Gravel From River-Bar to Plant.

MOVE MORE YARDS FASTER FOR LESS MONEY

Where loose materials (such as sand, gravel, blasted rock, ore, etc.) must be dug, hauled, and dumped at ranges from 100 to 1500 ft. the economical way to do it is with a SAUERMAN Scraper or Slackline Cableway.

These efficient machines haul 10 to 1000 cubic yards per hour, require only one operator, and demand little in maintenance. SAUERMAN units have made low cost records on dig-and-haul jobs all over the world for 30 years.

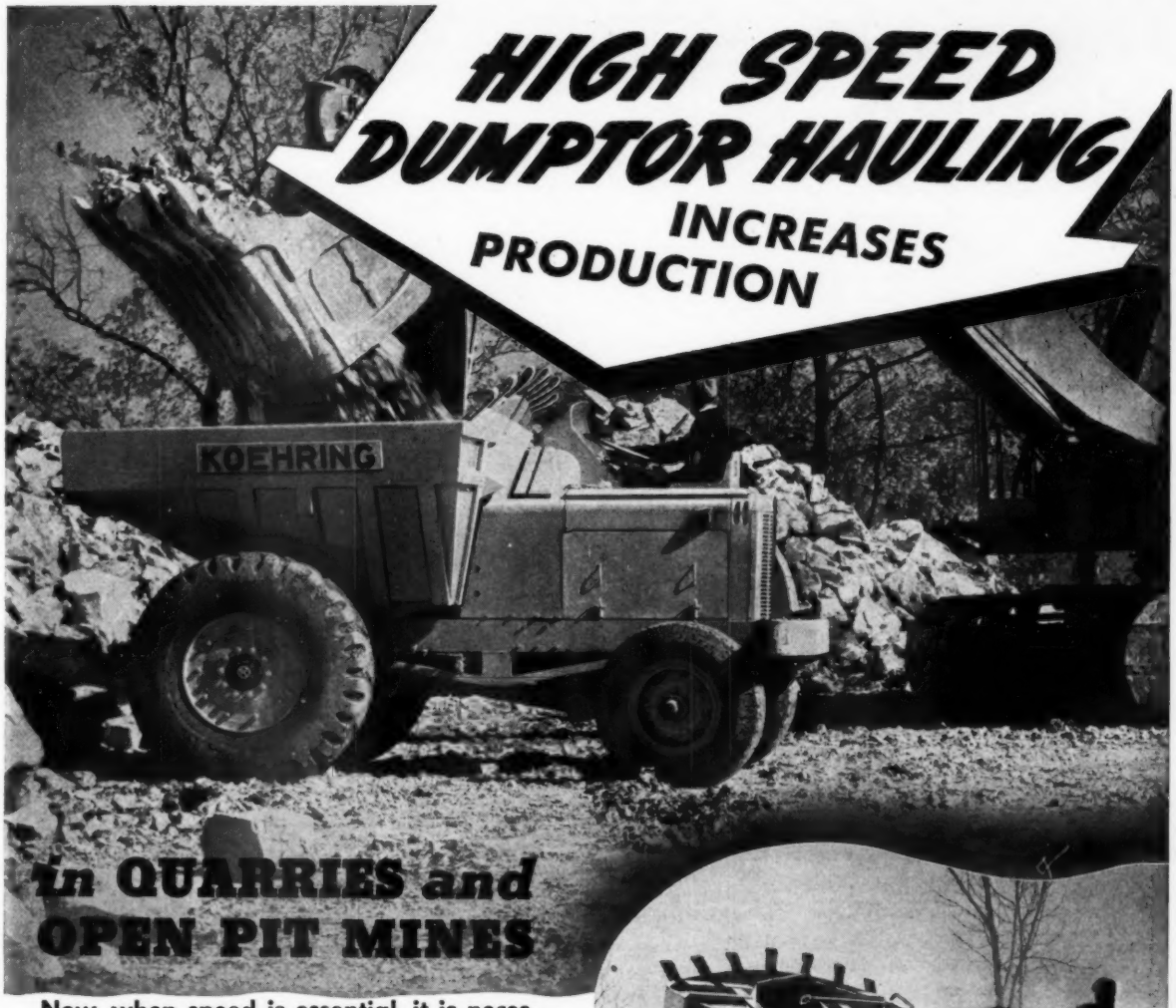
Write for Catalog.

SAUERMAN BROS., INC.
574 S. Clinton St., Chicago

SAUERMAN
LONG RANGE MACHINES

For your convenience in writing to Sauerman Bros., Inc., you will find a card bound in this issue.

HIGH SPEED DUMPTOR HAULING INCREASES PRODUCTION



in QUARRIES and OPEN PIT MINES

Now, when speed is essential, it is necessary to do the job in the shortest possible time. In quarries and open pit mines the Koehring Dumptor has been accepted as a high speed, dependable hauling unit. Important time-saving advantages are ***instantaneous*** dumping, three speeds, either forward or reverse, easy quick loading, G. M. Diesel power, constant mesh transmission. The Dumptor travels either way eliminating turns and backing. The Dumptor does not need to wait for body hoisting. It dumps by gravity, ***instantaneously***. Seconds saved in every operation, increases daily production.

KOEHRING CO., *Milwaukee, Wis.*

Saves Seconds Every Trip

Koehring Dumptor dumps *Instantaneously* to cars, hopper, grizzly or fill.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

For your convenience in writing to Koehring Co., you will find a card bound in this issue.

New trade literature

Title: "Wartime Building Construction"

Subject: This book reviews the general principles of wartime building. It stresses the degree of fire protection required and the best means of carrying out the work. There is a special section devoted to the construction of single story buildings to provide living quarters for armed forces, also for temporary office accommodations and hospitals. The book includes many diagrams, designs and detailed drawings.

Where to Get: Chemical Publishing Company, Inc., Brooklyn, New York. Price $4.00.

Title: "Canadian Mines Handbook — 1942"

Subject: This handbook is presented as a ready reference to the active mining companies of Canada, and to organizations not now active. Contains 248 pages listing 6,060 companies.

Where to Get: Northern Miner Press Limited, 122 Richmond Street, West, Toronto, Canada. Price $1.00.

Title: "Modern Wire Rope Digest"

Subject: A clear, interesting discussion of wire rope, covering its history, uses, structure and maintenance. The book is well illustrated with clear photographs and drawings. The back portion of the book contains useful reference data, and a complete glossary of terms. A valuable addition to the library of any person using wire rope.

Where to Get: American Chain & Cable Company, Inc., Wilkes-Barre, Pennsylvania. Price $2.50.

Title: "Ideal Transmission Catalog and Handbook"

Subject: A well prepared 56-page catalog complete with engineering data, installation examples, applications and many illustrations. Specifications are given for many of the series. The last four pages list and illustrate other Ideal products.

Where to Get: Ideal Commutator Dresser Co., Sycamore, Ill. Free upon request.

Title: "Earthmoving Equipment—1942"

Subject: A complete line catalog consisting of 32 pages devoted to equipment model pictures, action photos and condensed specifications on every construction and industrial tool in the LeTourneau line.

Where to Get: R. G. LeTourneau, Inc., Peoria, Illinois. Free upon request, ask for form A-276.

Title: "Band and Block Rubber Tracks"

Subject: An eight-page booklet, plentifully illustrated and with a large amount of data on a subject which is now of most vital importance to the nation. The booklet discusses the principles of both the band and block type rubber tracks and illustrates their differences.

Where to Get: B. F. Goodrich Company, Akron, Ohio. Free upon request.

Title: "Equipment For Soil Stabilization"

Subject: Printed in 2 colors, this 28-page catalog illustrates and describes the necessary tractors, graders, discs and other equipment needed for satisfactory soil-cement construction. Complete mechanical specifications are also provided.

Where to Get: Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Free upon request.

Title: "Simple Blueprint Reading with Special Reference to Welding"

Subject: A well-prepared textbook covering many of the common problems of blueprint reading. Large clear illustrations are used as study guides. The book uses welding symbols as standardized by the American Weld-

85 Years of Manufacturing Experience
The first Leschen Wire Rope was made by hand in an open field. Precision machines now do the work...

WE HUNG OUT OUR SHINGLE IN 1857

With the sky as our roof . . . the meadow as a floor . . . zeal and determination as "spark plugs" . . . and with "Quality First" as our motto — the first Leschen Wire Rope was made. Persistent progress based on cumulating experience has enabled us to keep abreast of the ever-increasing demands for our product, and now puts us in position to do our share in today's great emergency.

AMONG the fundamental factors that have made it possible for us to establish our high standards of wire rope efficiency are . . . the use of acid open-hearth steel wire . . . advanced manufacturing methods and machines . . . modern manufacturing facilities — *plus* diligent research in developing correct principles of wire rope design and construction, and the ready acceptance of such principles, whether developed in our own plant or elsewhere.

Our long experience in the wire rope industry has enabled us to recognize its many and diversified needs, and has qualified us to produce a correct type and grade of Leschen Wire Rope to meet its every requirement.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
CHICAGO • • 810 W. Washington Blvd.
DENVER • • • 1554 Wazee Street

SAN FRANCISCO • • 520 Fourth Street
PORTLAND • • 914 N. W. 14th Avenue
SEATTLE • • 3410 First Avenue South

For your convenience in writing to A. Leschen & Sons Co., you will find a card bound in this issue.

ing Society. Contains 145 pages of interesting material.

Where to Get. Lincoln Electric Company, Cleveland, Ohio. Price 50 cents in U. S. A., 75 cents elsewhere.

Title: **"Ropeology"**

Subject: A small, tabloid style publication devoted to a collection of wire rope users' experiences and modern methods of application. Planned as an occasional publication, the first issue was released in February.

Where to Get: Macwhyte Company, Kenosha, Wis. Free upon request.

Notes from the manufacturers

Pomona Pump Company, Pomona, California announces the purchase of the Westco Pump Division of Micro-Westco, Inc., Bettendorf, Iowa. The new business will be operated as Pomona Pump Company, Westco Division, at 2621 Locust Street, St. Louis, Missouri.

Cummins Diesel Engine Company, Columbus, Indiana, announces the appointment of D. J. Buttles as western manager with offices in the newly-established, direct factory branch at Salt Lake City. In addition to the Pacific Coast States, the territory includes British Columbia, Alaska and Hawaii.

Edwards Company, Sanford, North Carolina, manufacturers of self-propelled railway passenger motor cars, has purchased the Hill Diesel Engine Company, Lansing, Michigan, according to an announcement by the firm. Ralph B. Rogers, of New York City, is the new president of the Hill Company and retains his position as president of the Edwards Company.

Caterpillar Military Engine Company, a wholly owned subsidiary of Caterpillar Tractor Company has been formed to cooperate with military engineers in the planning, constructing and equipping of the plant and to carry on subsequent manufacturing operations at the option of the War Department.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pennsylvania, has announced the appointment of J. O. Sherrard, former design and construction engineer, as manager of the district manufacturing and repair department at Fairmont, West Virginia.

The Rawlplug Milwaukee Company, located at 647 West Virginia, Milwaukee, Wisconsin, has appointed Lee J. Grattan as manager. Mr. Grattan was connected with Engineering News-Record for nine years. His office will be located in Milwaukee.

Chain Belt Company, Milwaukee, Wisconsin, has appointed Pecant Industrial Supply Company, 1819 E. Fourth Street, Sioux City, Iowa, as distributor of Rex construction machinery in the Sioux City area.

POSITIONS WANTED

Address all box numbers c/o EXCAVATING ENGINEER South Milwaukee, Wis.

MACHINISTS WANTED!

All-around machinists or machine operators—planer, Gisholt, turrett, lathe, boring mill hands. Heavy work. Operators must be able to set up own jobs; read blue prints. Write full particulars including age, references, number of dependents and how soon you can report for work. Men now working in vital defense industries need not apply.

Box 9187

Superintendent or foreman, 10 years experience on general construction bridges, culverts, foundations, concrete masonry, excavation, revertment, coffer dams, pile driving. Good pusher, age 31, 3-A draft. Single, sober, American citizen, go any place. Box 9188

The Euclid Road Machinery Company, Cleveland, Ohio has announced the recent appointment of Tri-State Culvert Machinery Company of Atlanta as Euclid distributor for the State of Georgia. L. J. Moore, president, has had wide experience in the construction equipment field and has established an outstanding organization for the sales and service of road equipment and nationally known lines distributed by the company.

BARGAINS IN USED EQUIPMENT

FOR SALE, RENTALS, BUSINESS OPPORTUNITIES, TRADES, ETC.

To the reader wishing to advertise used equipment in the "For Sale" Section: All advertising in this section is payable in advance. Enclose your check or money order with copy. Rate: 60c per line. Minimum charge $2.40. No discounts; no commissions. If no change in copy is desired, three continuous insertions are offered for the price of two. Read these instructions carefully. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Count your own copy to save delay. Holding up your advertisement one month to secure approval of revised copy or an additional remittance may cost you real money in a lost sale. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January issue closes December 15th.

To the reader wishing to answer "For Sale" Section advertisements appearing on these pages: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

SMALL SHOVELS, CRANES AND DRAGLINES
Up to 2½ Cubic Yards

BUCYRUS-ERIE 45-B 65' boom gas dragline. 2 yd. bucket. Buda engine. Good working condition. Located Louisiana. Box 2812

BUCYRUS-MONIGHAN 2-W dragline. 70-ft. boom. Fairbanks-Morse diesel engine. 1500 W Kohler light plant. Hendrix 2½-yd. and Page RM 2-yd. buckets. Some spare parts. First class condition. Recently repainted. Located 40 mi. NW. Baton Rouge, Louisiana, 5 mi. from rail shipping point. Available for immediate shipment because of curtailed levee building program. Price reasonable. Box 2866

BUCYRUS-ERIE 17-B Shovel equipment. Practically new. Will also fit 19-B. Located Texas. Box 2815

BUCYRUS-ERIE Class 14 Steam Dragline. 60' boom, 2 cu. yd. drag bucket, Caterpillar mounted. Now in operation. Located Tennessee. Box 2722

BUCYRUS-MONIGHAN 3-W Walking Dragline No. 454—equipped 140 hp Fairbanks diesel engine, 80-ft. boom, also 110-ft. boom with 2-yd. bucket—Good Condition—located at Sampsel, Mo., plant on Wabash railroad. Crane available for loading. Cooley Gravel Company, Chillicothe, Mo.

BUCYRUS-ERIE GA-2 gas-air shovel equipped with 24' boom, 18'4" dipper handle, 1¼-yd. dipper, chain drive caterpillar, and powered with Waukesha 4 cylinder WS gasoline engine. Located in Washington, D. C. Box 2861

LARGE SHOVELS, CRANES AND DRAGLINES
2½ Cubic Yards and Over

FOR SALE—Available immediately—One Marion Model 5480 shovel, located in southern Illinois; equipped with 90' boom, 64' handle and 5 cu. yd. BECO dipper; maximum dumping height 68'; arranged for a power supply of 3 phase, 60 cycle, 4000 volts; requires 25 cars for shipping. Box 2860

BUCYRUS-MONIGHAN 4-W Diesel Dragline. 110' Boom. 4½-yd. Bucket. Reported good working condition. Some extra parts included. Located Georgia. Box 2796

FOR SALE

MARION MODEL 125 electric shovel, crawler mounted, 55' boom, 36' handle, 2½-yard bucket. For power supply 3 phase, 60 cycle, 2300 volts. Box 2864

BUCYRUS-ERIE 120-B Combination Shovel and dragline. Electrically equipped. Suitable for power supply of 3 phase 60 cycle 2300 volts. Shovel equipment includes one each 4 and 7 yard dippers. Dragline boom 100' and includes 5 yard drag bucket. Also some spare parts. Machine available for demonstration to prospective purchaser. Located California. Box 2819

BUCYRUS-ERIE CLASS 230 Diesel Electric Dragline. 150' boom. 6-cu. yd. bucket. Light weight cats. Powered by two units each consisting of Atlas Diesel 6-cylinder 9"x10½" engine and 120 KW 250 volt direct current generator. Hoist motor 250 HP. Swing motor 75 HP. Can be bought at bargain. Located Florida. Box 2797

BUCYRUS-ERIE 52-B 60' boom Diesel dragline. 3 yard bucket. Located Louisiana. Box 2813

BUCYRUS-ERIE Class 230 150' boom steam dragline. Wheel trucks. Good working condition. Located Mississippi. Box 2814

MARION Model 260 Steam Dragline. 115' boom. 3½-yd. drag bucket. Truck mounted. Now operating in Tennessee. Box 2721

BUCYRUS-MONIGHAN Model 6150 dragline, equipped with 175' boom, 8 yd. dragline bucket; powered by Fairbanks-Morse Diesel engine; reported in A-1 condition; located Southeast. Box 2873

CLASS 14 STEAM DRAGLINE, 87½ ft. boom, 2½ yd. bucket. Working in Coshocton, Ohio. Immediately available. Price $10,000. Kleen Coal Co., 948 E. Main St., Coshocton, Ohio.

THREE MARION MODEL 125 3 yard electric shovels in A-1 condition. Suitable for power supply of 3 phase 60 cycle 2300 volts and 3 phase 60 cycle 4000 volts. General Electric equipment. Located Minnesota. Box 2820

TWO BUCYRUS-MONIGHAN DIESEL DRAGLINES; available immediately. Good condition. Equipped with 135' boom, 4-yd. AX and extra 5-yd. type AU buckets. Also some spare parts. Located southeast. Box 2869

LIMA 801 DRAGLINE, 70' boom, 2½ yd. Red Arch bucket. Dragline and motor recently rebuilt at cost of $9,000. Or will trade for diesel dragline in good condition comparable to Monighan 5-W or larger. Box 2874

AVAILABLE 30 to 60 days. 1 Lima 1001 Model Dragline, 3 cu. yd. Page R.C. bucket, 80' boom. 1 Lima 901 Model Dragline, 2½ cu. yd. Page R.C. bucket, 80' boom. Both above machines equipped with extra wide cats, Waukesha-Hesselman semi-diesel motors, and are in excellent condition. Box 2871

Bucyrus 50B steam shovel, 100% overhauled.

Bucyrus 50B elec. shovels (2); also 80B steam shovel, 2¼ yd., 50' bm., on cats.

Milwaukee 12-ton gas locomotive, std. ga., MCB couplers, 100% overhauled; also others, 20 to 7 tons, 36"-30"-24" gauge.

Buckeye, P&H, Austin trench excavators (7).

Bucyrus-Monighan Walker draglines (2), 3-yd., Diesel & elec., 70' & 90' booms.

Bucyrus 52-B Diesel dragline-shovel.

Northwest 1-yd. 105 comb. gas crane-shovel.

Industrial 25-ton stm. loco. crane, 50' bm.

Brownhoist portal gantry cranes (2), elec.

H. Y. Smith Co., 828 N. B'way, Milwaukee, Wis.

FOR SALE

2-yd. Steel Hull Dipper Dredge.
1½-yd. Steel Hull Dipper Dredge.
3-yd. Steel Hull Clamshell Dredge.
2½-yd. Dragline.

10" Steel Hull Hydraulic Dredge, powered with latest type Fairbanks-Morse engines and fully equipped attendant plant. Dredge now working. Also several medium size steel barges. This is excellent equipment, and is being operated by an old firm wishing to retire from business. Terms could be extended to reliable firm. Box 2862

TRACTORS, SCRAPERS, 'DOZERS, GRADERS, ETC.

MODEL M-81 BUCYRUS-ERIE 4-Wheel Scraper, equipped with 10.50-20 tires—singles front, duals rear. Model P-24 single drum Winch adapted for mounting on Model TD-18 International TracTracTor. Entire equipment, including tires, in excellent shape. Used less than five months. Price for complete equipment $2000 f.o.b. Buffalo, New York. Box 2865

TWO MODEL "W" 18-yard LeTourneau Scrapers; 2 RD8 tractors; 1 RD8 tractor with LeTourneau Bulldozers; also new tracks, sprockets, rollers and tires on hand. This is first class equipment. Alpine Excavating Co., St. Ignace, Mich.

HEIL-BAKER HYDRAULIC 2-Wheel Scoop Model 190-A, 3-yd., end dump, for sale or rent. This equipment used less than two months is in excellent condition, including rubber tires. Has new cutting edge. Available at once. No priority or sales tax required. For use with 30-55 hp tractors equipped hydraulic pump. For sale—One 5-7 ton, 3-wheel gasoline Galion Junior Road Roller powered with Fordson motor, equipped with sub-planer, recently overhauled and in good operating condition. Both above priced reasonably. Located Warren, Ohio. Box 2872

2 MODEL L A-C TRACTORS, silently geared niggerhead winches. 27-E Rex power. Cletrac 55; also parts for Cletracs 35 & 55. Bulldozers, Garwood & Isaacson, complete 10 hydraulic dumps, 2 & 2½ yard. 12 Hercules JXC gas motors. Parts for Chev., Ford, G.M.C., Indiana, Dodge and Federals. Sols, 95 Flat Shoals Ave., Atlanta, Ga.

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New and Rebuilt, sizes from 1¼ to 2½ cubic yard. Priced for quick sale, Bargains

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CLEVELAND, OHIO

FOR SALE—ENGINES

5 International 10-20 (new); five slightly used and 3 International 15-30. These last 8 units are mounted on crawlers, but can be changed to steel wheels or rubber mounting. All in fine condition. Will sell separate or mounted. Also have 85 hp. Miller gas engine. Shunk Mfg. Co., Bucyrus, Ohio.

BOILER at slashed price. Locomotive type, 75 h.p. under forced draft, 40 h.p. natural draft, 44"x17' 125 lb. working pressure A.S.M.E. Std. Will fit 68-C shovel. Surplus stock. Good as new. Why pay more if this bargain will make money for you? Offered subject to prior sale.
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BUCYRUS-ERIE COMPANY
PARTS DEPARTMENT
SOUTH MILWAUKEE, WIS.

FOR RENT OR SALE

½-yd. Shovel, Browning Crane 35 ft. boom, 10-B shovel attachment only, ¾ revolving ⅝-yd. dragline, No. 10 Cat. Auto Patrol, Cat. 50 Diesel & Cat. 50 Diesel (wide tread), 60 & 35 gas, Ford Tractor, Cat. 50 Diesel (wide tread) & LeTourneau cable dozer, 7S Wonder mixer, 18 Fresnos 42 inch, 8-Ton steam tandem, 5-Ton 3-wheel gas roller, ½-yd. clam bucket, Jaeger-Lakewood high speed concrete finisher. Wm. Bros. Pneumatic rollers—rent only. Clifford Waterhouse, Jackson, Miss.

NO. 6 CHAMPION CRUSHER, manganese jaws. Capacity at least 50 tons per hour. Used very little. Owner has no further use for it. Priced to sell immediately. E. E. Austin & Son, 20th and Reed Sts., Erie, Pa.

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Here are three new and three used **Dragline buckets—offered at bargain prices.**

ONE ⅝-AX Beco Rebuilt, 1,600 lbs.
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WANTED

WANTED

Transmission case T40 Int. TracTracTor also carburetors, generators, starters for Model-L A-C tractors. Box 2875

WANTED

Loading machine for gravel; dragscraper equipment 1 to 2 yds.; single drum hoist about 6 tons lift. Write Room 916, 70 Pine St., N. Y. C.

WANTED

Shovel equipment for 50-B diesel draglines. Write complete description including price. Box 2870

WANTED—Two Gasoline or Diesel Draglines, Monighan and Bucyrus 45-B or larger. 25 to 35 ton standard gauge locomotive.

MONTEZUMA GRAVEL COMPANY
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WANT TO BUY—1000 or 1500 ft. Air Compressor. 2 to 4-yd. Diesel or Electric Shovel. 25 Ton or heavier Locomotive Crane. 5 or 6-yd. Dragline. 10-B ⅝-yard Gas Shovel.

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